2004 ENGINE PERFORMANCE

Fuel & Emissions Systems - TSX

SPECIAL TOOLS

Ref. No.	Tool Number	Description	Qty
①	A973X-041-XXXXX	Vacuum Pump/Gauge, 0—30 in.Hg	1
②	07JAZ-001000B	Vacuum/Pressure Gauge, 0—4 in.Hg	1
③	07SAZ-001000A	Backprobe Set	2
④	07NAJ-P07010A	Pressure Gauge Adapter	1
⑤	07XAA-001010A	Fuel Sender Wrench	1
⑥	07ZAJ-S5A0100	Fuel Pressure Gauge Set	1
⑦	07ZAJ-S7C0100	Fuel Hose Attachment	1
⑧	07ZAJ-S7C0200	Fuel Joint Attachment	1
⑨	07ZAJ-S5A0200	Hose, Oil Pressure	1
⑩-1	07406-0020201	A/T Pressure Hose	1
⑩-2	07406-0070300	A/T Low Pressure Gauge W/Panel	1
⑩-3	07MAJ-PY4011A	A/T Pressure Hose, 2,210 mm	1
⑩-4	07MAJ-PY40120	A/T Pressure Hose, Adapter	1
⑪	07406-004000A	Fuel Pressure Gauge	1

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Fig. 1: Special Tools (1 Of 2)

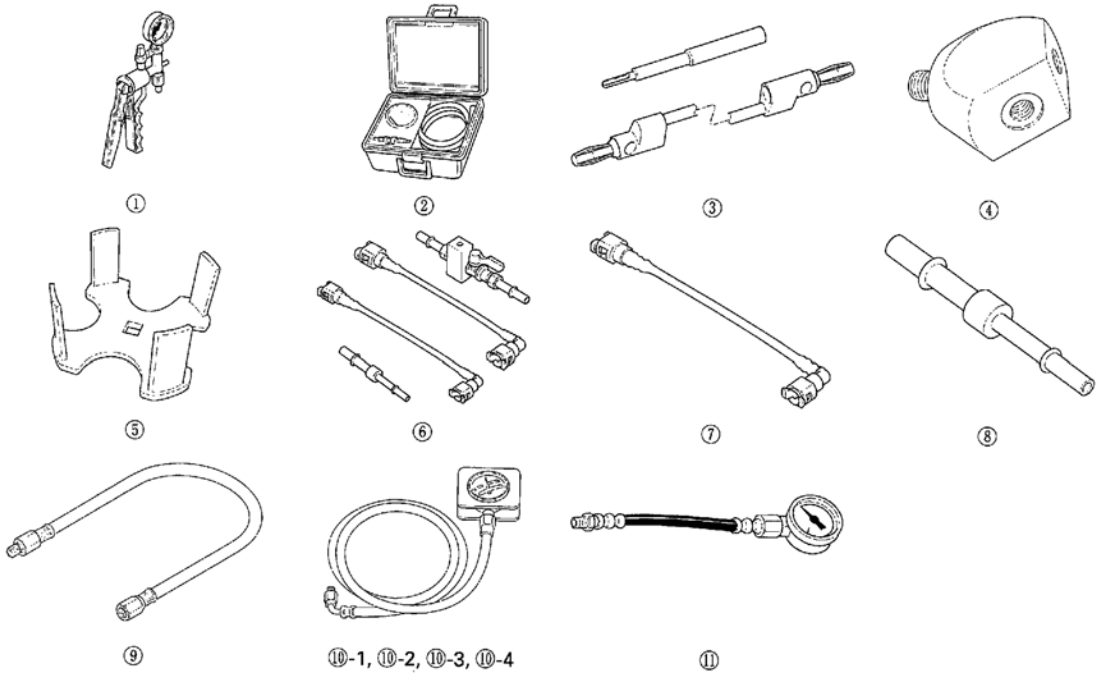

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Fig. 2: Special Tools (2 Of 2)

GENERAL TROUBLESHOOTING INFORMATION

INTERMITTENT FAILURES

The term "intermittent failure" means a system may have had a failure, but it checks OK now. If the malfunction indicator lamp (MIL) on the dash does not come on, check for poor connections or loose pins at all connectors related to the circuit that you are troubleshooting.

OPENS & SHORTS

"Open" and "Short" are common electrical terms. An open is a break in a wire or at a connection. A short is an accidental connection of a wire to ground or to another wire. In simple electronics, this usually means something won't work at all. With complex electronics (such as ECMs and PCMs) this can sometimes mean something works, but not the way it's supposed to.

HOW TO USE THE HDS (HONDA DIAGNOSTIC SYSTEM)

If the MIL (Malfunction Indicator Lamp) has come on

1. Start the engine and check the MIL (A).

NOTE: If the ignition switch is turned ON (II), and the engine is not started, the MIL will stay on for 15-20 seconds (see HOW TO SET READINESS CODES).

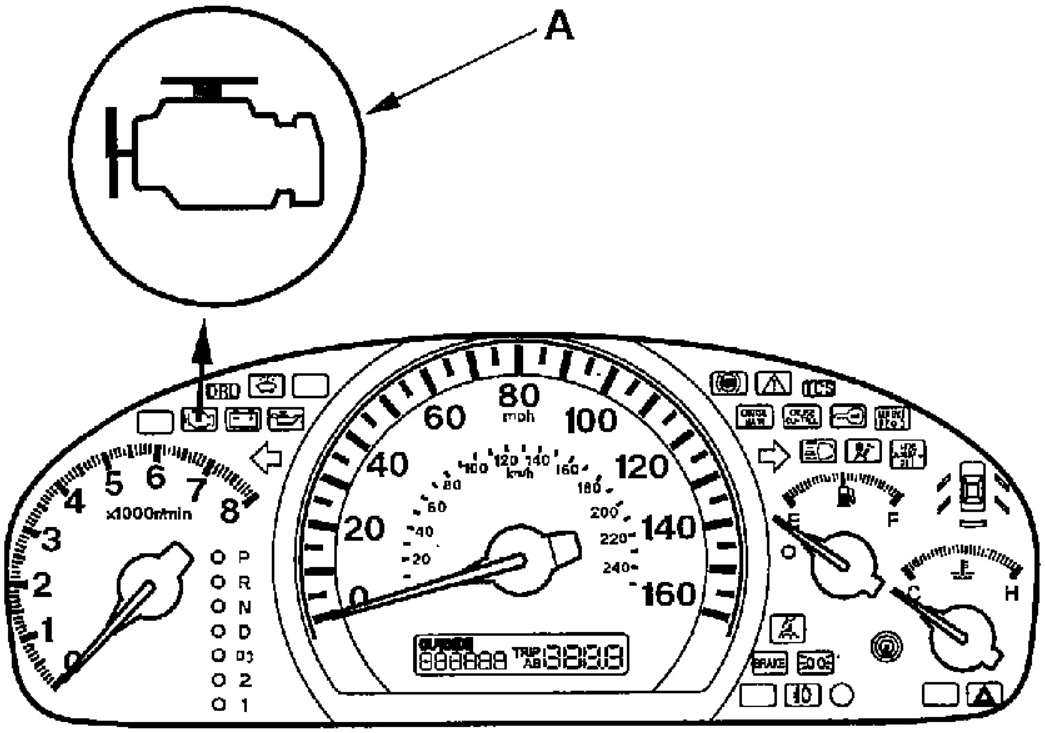

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Fig. 3: Identifying MIL (Malfunction Indicator Lamp)

2. If the MIL stays on, connect the HDS to the data link connector (DLC) (A) located under the driver's side of the dashboard.

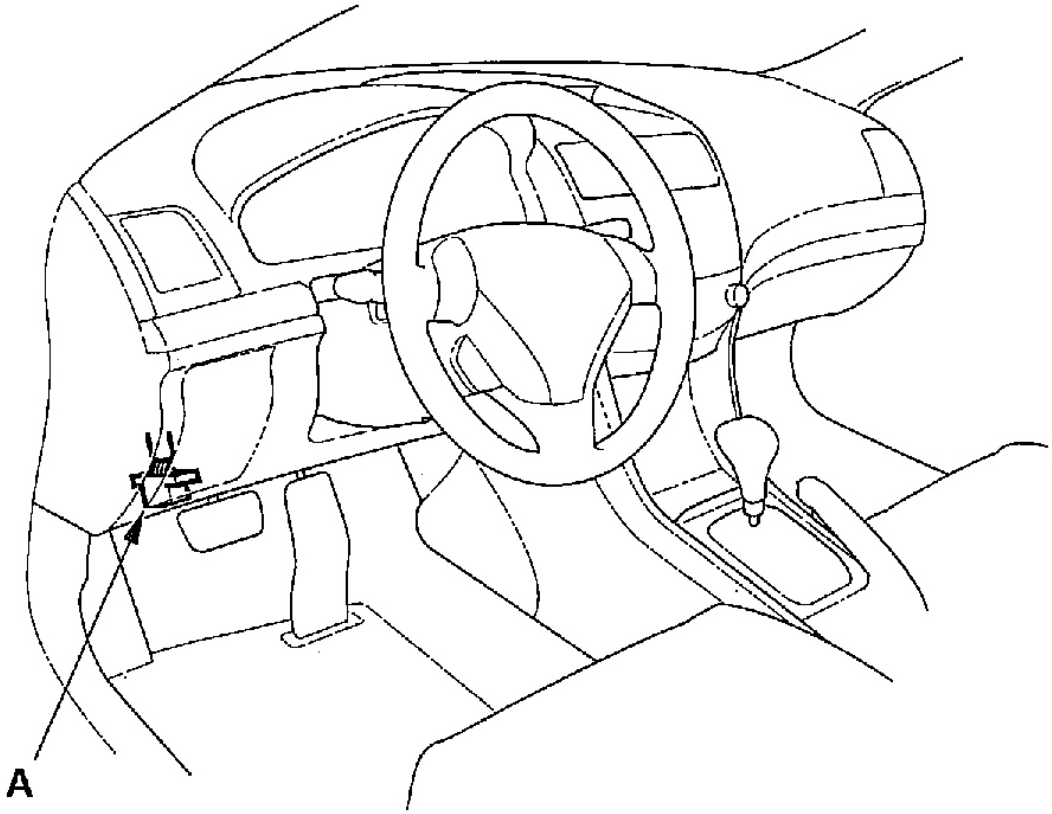

Fig. 4: Connecting The HDS To The Data Link Connector (DLC) Located Under The Driver's Side Of The Dashboard

3. Turn the ignition switch ON (II).
4. Check the diagnostic trouble code (DTC) and note it. Also check the freeze data. Refer to the DTC Troubleshooting Index and begin the appropriate troubleshooting procedure.

NOTE:

- **Freeze data indicates the engine conditions when the first malfunction, misfire, or fuel trim malfunction was detected.**
- **The HDS can read the DTC, freeze data, current data, and other engine control module (ECM)/powertrain control module (PCM) data.**
- **For specific operations, refer to the user's manual that came with the HDS.**

5. If no DTC are found, go to MIL troubleshooting (see **MIL CIRCUIT TROUBLESHOOTING**).

If the MIL did not stay on

If the MIL did not stay on but there is a driveability problem, refer to the Symptom Troubleshooting Index in this section.

If you can't duplicate the DTC

Some of the troubleshooting requires you to reset the ECM/PCM and try to duplicate the DTC. If the problem is intermittent and you can't duplicate the code, do not continue through the procedure. To do so will only result in confusion and, possibly, a needlessly replaced ECM/PCM.

HDS CLEAR COMMAND

The ECM/PCM stores various specific data to correct the system even when there is no electrical power such as the battery negative terminal or No. 8 FI ECU (ECM/PCM) (15A) fuse are disconnected. Stored data based on failed parts should be cleared by using the "CLEAR COMMAND" of the HDS, if parts are replaced.

The HDS has three kinds of clear commands to meet the purpose. They are DTC clear, ECM/PCM clear, and CKP pattern clear. DTC clear command erases all stored DTC codes, freeze data and readiness codes. This must be done with the HDS after reproducing the DTC during troubleshooting in this service manual.

ECM/PCM clear command erases all stored DTC codes, freeze data, readiness codes, and all specific data to correct the system except CKP pattern. If the CKP pattern data in ECM/PCM was cleared, you must do the CKP pattern learn procedure. The CKP pattern clear command erases only CKP pattern data. This command is for the repair of a misfire or CKP sensor.

DTC CLEAR

1. Do the DTC CLEAR in the CLEAR MENU with the HDS while the engine is stopped.
2. Turn the ignition switch OFF.
3. Turn the ignition switch ON (II). Wait for 30 seconds.
4. Turn the ignition switch OFF, and disconnect the HDS from the DLC.

ECM/PCM RESET

This command clears stored specific data from each vehicle such as DTCs freeze data, and readiness codes. It does not clear CKP PATTERN data.

1. Do the ECM/PCM RESET in the CLEAR MENU with the HDS while the engine is stopped.
2. Turn the ignition switch OFF.
3. Turn the ignition switch ON (II). Wait for 30 seconds.
4. Turn the ignition switch OFF, and disconnect the HDS from the DLC.
5. Do the ECM/PCM idle learn procedure (see **ECM/PCM IDLE LEARN PROCEDURE**).

CKP PATTERN CLEAR/CKP PATTERN LEARN PROCEDURE

Enable Criteria

ECT at 176°F (80°C) or higher.

Procedure

1. Do the CKP PATTERN CLEAR in the CLEAR MENU with the HDS while the engine is stopped.
2. Turn the ignition OFF.
3. Turn the ignition ON (II), and wait for 30 seconds.
4. Test-drive the vehicle on a level road: Decelerate (with the throttle fully closed) from engine speed of 2,500 RPM to 1,000 RPM with the A/T in 2 position, or the M/T in 2nd or 3rd gear.
5. Stop the vehicle. Do not turn the ignition off.
6. Select the ALL DATA LIST in the DATA LIST MENU of the HDS.
7. Check the status of PULSER F/B LEARN. If it is set to NG, the enable criteria was probably not met; repeat the procedure from the beginning.

HOW TO END A TROUBLESHOOTING SESSION (REQUIRED AFTER ANY TROUBLESHOOTING)

1. Do the ECM/PCM RESET in the CLEAR MENU with the HDS.
2. Do the ECM/PCM idle learn procedure (see **ECM/PCM IDLE LEARN PROCEDURE**).
3. Turn the ignition switch OFF.
4. Disconnect the HDS from the DLC.

NOTE: The ECM/PCM is part of the immobilizer system. If you replace the ECM/PCM, it will have a different immobilizer code. In order for the engine to start, you must rewrite the immobilizer code with the HDS.

HOW TO REMOVE THE ECM/PCM FOR TESTING

If DTC troubleshooting requires voltage or resistance checks at the ECM/PCM connectors, remove the ECM/PCM and test it.

1. Jump the SCS line with the HDS.
2. Remove the center lower covers (A).

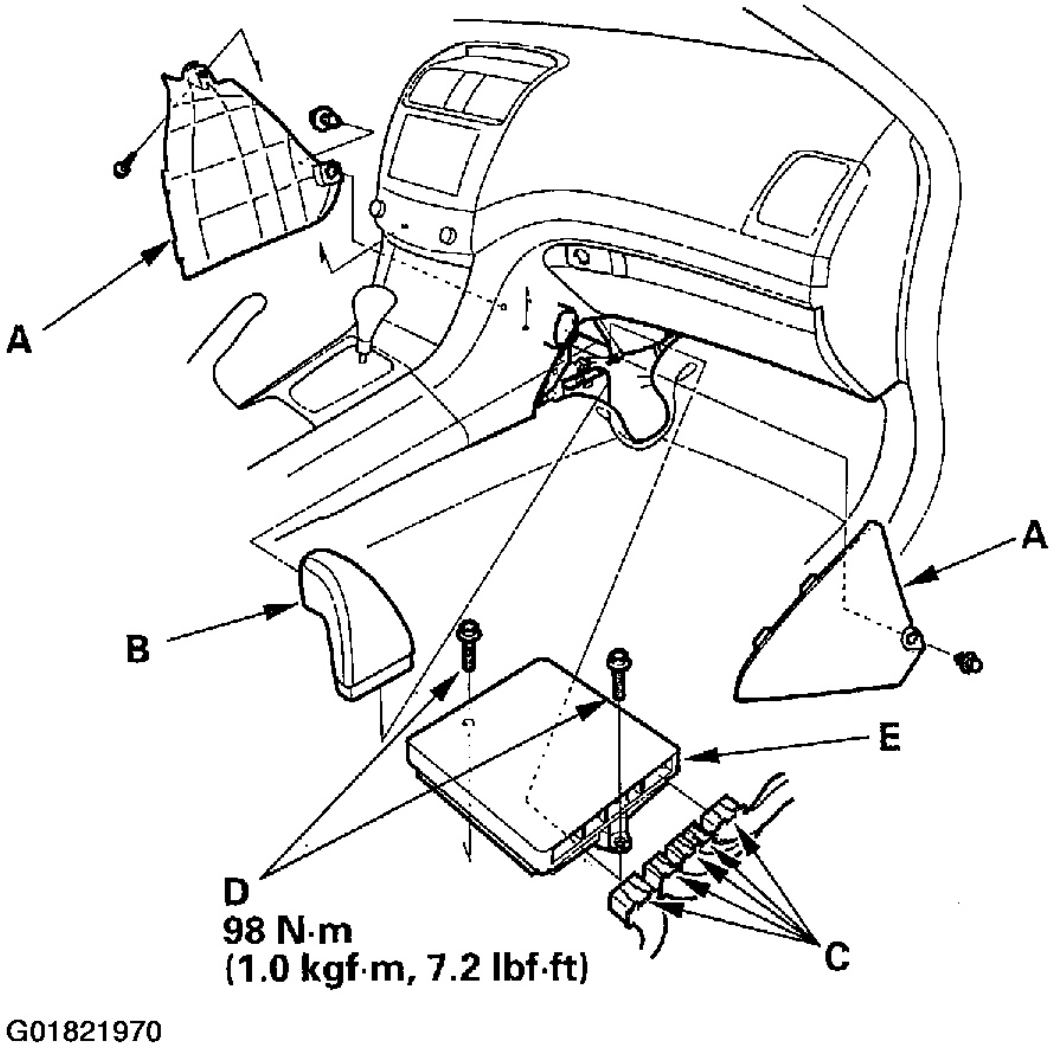

Fig. 5: Removing The ECM/PCM

3. Remove the duct (B).
4. Disconnect the ECM/PCM connectors (C).
5. Remove the bolts (D), then remove the ECM/PCM (E).
6. Install the ECM/PCM in the reverse order of removal.
7. Open the SCS line with the HDS.

HOW TO TROUBLESHOOT CIRCUITS AT THE ECM/PCM

Special Tools Required:

- Digital Multimeter KS-AHM-32-003 (1) or a commercially available digital multimeter
- Backprobe Set 07SAZ-001000A (2)

1. Connect the backprobe adapters (A) to the stacking patch cords (B), and connect the cords to a digital multimeter.

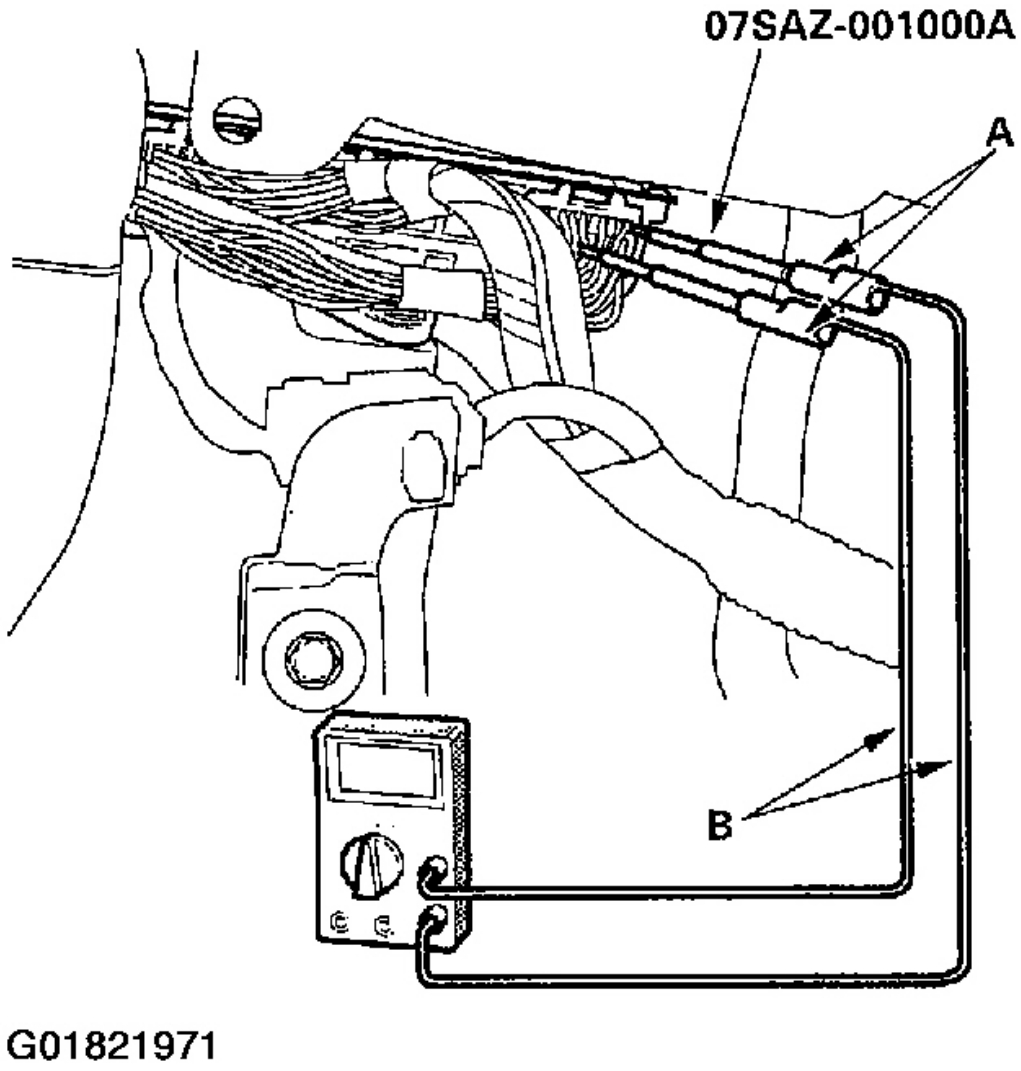

Fig. 6: Connecting The Backprobe Adapters To The Stacking Patch Cords & The Cords To A Digital Multimeter

2. Using the wire insulation as a guide for the contoured tip of the backprobe adapter, gently slide the tip into the connector from the wire side until it touches the end of the wire terminal.

3. If you cannot get to the wire side of the connector or the wire side is sealed (A), disconnect the connector and probe the terminals (B) from the terminal side. Do not force the probe into the connector.

NOTE: Do not puncture the insulation on a wire. Punctures can cause poor or intermittent electrical connections.

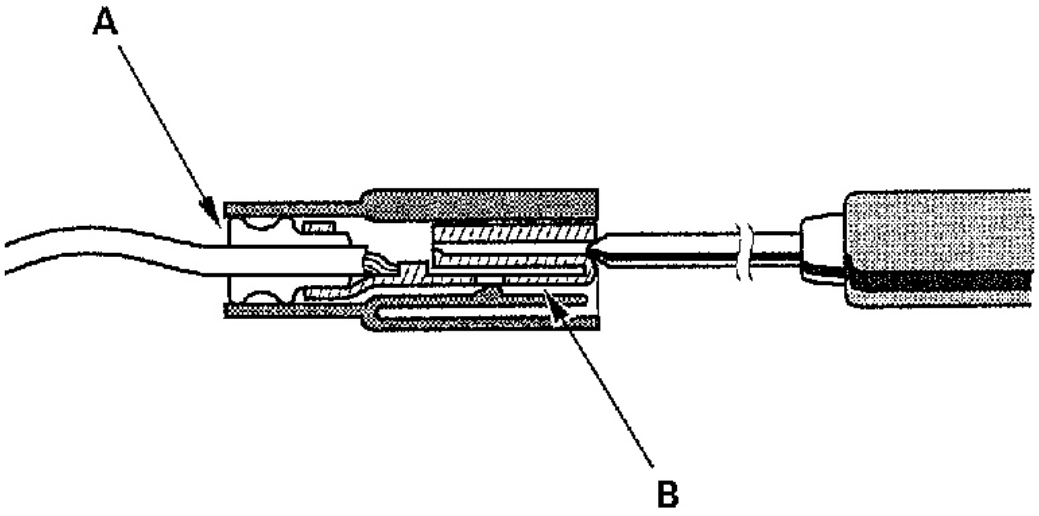

Fig. 7: Do Not Force The Probe Into The Connector

ECM/PCM UPDATING AND SUBSTITUTION FOR TESTING

Special Tools Required: Honda Interface Module (HIM) EQS05A35570

Use this procedure when you have to substitute a known-good ECM/PCM in a troubleshooting procedure. Update the ECM/PCM only if the ECM/PCM does not have the latest software loaded.

NOTE: Do not turn the ignition switch OFF while updating the ECM/PCM. If you turn the ignition switch OFF before completion, the ECM/PCM can be damaged.

HOW TO UPDATE THE ECM/PCM

NOTE:

- **To ensure the latest program is installed, do an ECM/PCM update whenever the ECM/PCM is substituted or replaced.**
- **You can not update an ECM/PCM with the program it already has. It will only accept a new program.**

- **Before you update the ECM/PCM, make sure the vehicle's battery is fully charged.**
- **To prevent ECM/PCM damage, do not operate anything electrical (audio system, brakes, A/C, power windows, moonroof, door locks, etc.) during the update.**
- **If you need to diagnose the Honda Interface Module (HIM) because the HIM's red (#3) light came on or was flashing during the update, leave the ignition switch in the ON (II) position when you disconnect the HIM from the data link connector (DLC). This will prevent ECM/PCM damage.**

1. Turn the ignition switch ON (II). Do not start the engine.
2. Connect the HDS or the Honda Interface Module (HIM) to the data link connector (DLC) (A) located under the driver's side of the dashboard.

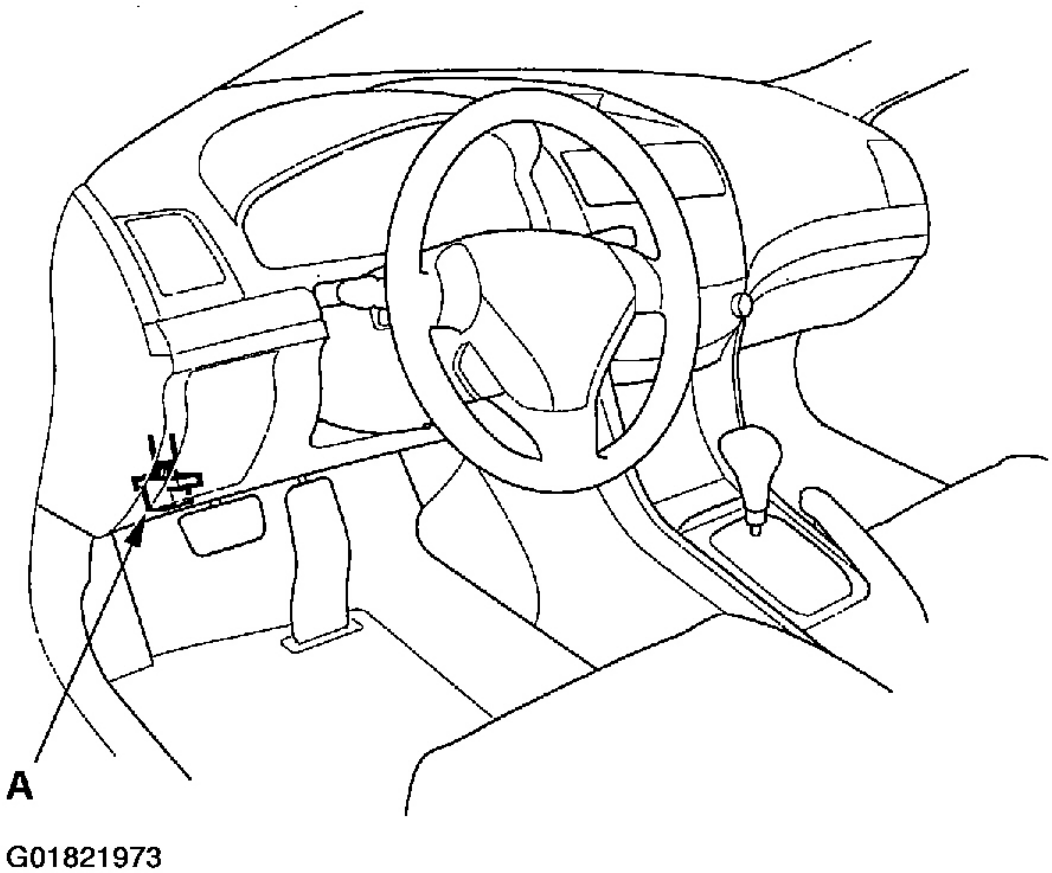

Fig. 8: Connecting The HDS Or HIM To The Data Link Connector (DLC) Located Under The Driver's Side Of The Dashboard

3. Do the ECM/PCM update procedure as described on the HIM label and in the ECM/PCM update system.
4. Do the ECM/PCM idle learn procedure (see **ECM/PCM IDLE LEARN PROCEDURE**).
5. Do the CKP pattern learn procedure, if you did the troubleshooting for DTC P0300, P0301, P0302, P0303, P0304, P0335 or P0339.

HOW TO SUBSTITUTE THE ECM/PCM

1. Remove the ECM/PCM form the vehicle.
2. Install a known-good ECM/PCM.
3. Rewrite the immobilizer code with the ECM/PCM replacement procedure in the HDS; it allows you to start the engine.
4. After completing your tests, install the original ECM/PCM and rewrite the immobilizer code with the ECM/PCM replacement procedure in the HDS.

OBD STATUS

The OBD status shows the current system status of each DTC and all of the parameters. This function is used to see if the technician's repair was successfully finished. The results of diagnostic tests for the DTC are displayed as:

- **PASSED:** On board diagnosis is successfully finished.
- **FAILED:** On board diagnosis has finished but failed.
- **EXECUTING:** The vehicle is in enable criteria conditions for the DTC and the on board diagnosis is running.
- **NOT COMPLETED:** The on board diagnosis was running but is out of the enable conditions of the DTC.
- **OUT of COND:** The vehicle has stayed out of the enable conditions of the DTC.

DTC TROUBLESHOOTING INDEX

DTC (MIL indication*1)	Temporary DTC (Temporary)	Detection Item	MIL
P0010 (56)	———	Variable Valve Timing Control (VTC) Oil Control Solenoid Valve Malfunction	ON
P0011 (56)	P0011	Variable Valve Timing Control (VTC) System Malfunction	ON
P0107 (3)	———	Manifold Absolute Pressure (MAP) Sensor Circuit Low Voltage	ON
P0108 (3)	———	Manifold Absolute Pressure (MAP) Sensor Circuit High Voltage	ON
P0112 (10)	———	Intake Air Temperature (IAT) Sensor Circuit Low Voltage	ON
P0113 (10)	———	Intake Air Temperature (IAT) Sensor Circuit High Voltage	ON
P0116 (86)	P0116	Engine Coolant Temperature (ECT) Sensor Range/Performance Problem	ON
P0117 (6)	———	Engine Coolant Temperature (ECT) Circuit Low Voltage	ON
P0118 (6)	———	Engine Coolant Temperature (ECT) Circuit High Voltage	ON
P0122 (7)	———	Throttle Position (TP) Sensor A Circuit Low Voltage	ON
P0123 (7)	———	Throttle Position (TP) Sensor A Circuit High Voltage	ON
P0125 (86)	P0125	Engine Coolant Temperature (ECT) Sensor Malfunction Slow Response	ON
P0128 (87)	P0128	Cooling System Malfunction	ON
P0133 (61)	P0133	Air Fuel Ratio (A/F) Sensor (Sensor 1) Response Malfunction	ON
P0134 (41)	———	Air Fuel Ratio (A/F) Sensor (Sensor 1) Heater System Malfunction	ON
P0135 (41)	———	Air Fuel Ratio (A/F) Sensor (Sensor 1) Heater Circuit Malfunction	ON
P0137 (63)	P0137	Secondary Heated Oxygen Sensor (Secondary HO2S (Sensor 2)) Circuit Low Voltage	ON
P0138 (63)	P0138	Secondary Heated Oxygen Sensor (Secondary HO2S (Sensor 2)) Circuit High Voltage	ON
P0139 (63)	P0139	Secondary Heated Oxygen Sensor (Secondary HO2S (Sensor 2)) Slow Response	ON
P0141 (65)	———	Secondary Heated Oxygen Sensor (Secondary HO2S (Sensor 2)) Heater Circuit Malfunction	ON
P0171 (45)	P0171	Fuel Supply System Too Lean	ON
P0172 (45)	P0172	Fuel Supply System Too Rich	ON
P0222 (7)	———	Throttle Position (TP) Sensor B Circuit Low Voltage	ON
P0223 (7)	———	Throttle Position (TP) Sensor B Circuit High Voltage	ON
P0300 some P0301 and P0302 of P0303 P0304	P0300 and some of P0301 P0302 P0303 P0304	Random Misfire Detected	ON
P0301 (71)	P0301	No. 1 Cylinder Misfire	ON
P0302 (72)	P0302	No. 2 Cylinder Misfire	ON
P0303 (73)	P0303	No. 3 Cylinder Misfire	ON
P0304 (74)	P0304	No. 4 Cylinder Misfire	ON
P0325 (23)	———	Knock Sensor Circuit Malfunction	ON
P0335 (4)	———	Crankshaft Position (CKP) Sensor No Signal	ON
P0339 (4)	———	Crankshaft Position (CKP) Sensor Circuit Intermittent Interruption	ON
P0340 (57)	———	Camshaft Position (CMP) Sensor A No Signal	ON
P0341 (57)	———	Camshaft Position (CMP) Sensor and Crankshaft Position (CKP) Sensor Incorrect Phase Detected	ON
P0344 (57)	———	Camshaft Position (CMP) Sensor A Intermittent Interruption	ON
P0365 (8)	———	Camshaft Position (CMP) Sensor B No Signal	ON
P0369 (8)	———	Camshaft Position (CMP) Sensor B Intermittent Interruption	ON
P0420 (67)	P0420	Catalyst System Efficiency Below Threshold	ON
P0442 (90)	P0442	Evaporative Emission System Small Leak Detected	ON
P0443 (92)	———	Evaporative Emission (EVAP) Control System Canister Purge Valve Circuit Malfunction	ON

* 1: These DTCs are indicated by a blinking MIL when the SCS line is jumped with the HDS.

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Fig. 9: DTC Troubleshooting Index (1 Of 3)

DTC (MIL indication *1)	Temporary DTC (Temporary)	Detection Item	MIL
P0451 (91)	P0451	Evaporative Emission Control System Fuel Tank Pressure (FTP) Sensor Range/Performance Problem	ON
P0452 (91)	P0452	Evaporative Emission Control System Fuel Tank Pressure (FTP) Sensor Circuit Low Voltage	ON
P0453 (91)	P0453	Evaporative Emission Control System Fuel Tank Pressure (FTP) Sensor Circuit High Voltage	ON
P0456 (90)	P0456	Evaporative Emission System Very Small Leak Detected	ON
P0457 (90)	P0457	Evaporative Emission System Leak Detected/Fuel Cap Loose or Missing	ON
P0496 (92)	P0496	Evaporative Emission System High Purge Flow	ON
P0497 (90)	P0497	Evaporative Emission System Low Purge Flow	ON
P0498 (117)	———	Evaporative Emission System Vent Shut Valve Circuit Low Voltage	ON
P0499 (117)	———	Evaporative Emission System Vent Shut Valve Circuit High Voltage	ON
P0506 (14)	P0506	Idle Control System RPM Lower Than Expected	ON
P0507 (14)	P0507	Idle Air Control System RPM Higher Than Expected	ON
P0563 (34)	———	Engine Control Module (ECM)/Powertrain Control Module (PCM) Power Source Circuit Unexpected Voltage	ON
P0603 (131)	———	ECM/PCM Internal Control Module Keep Alive Memory (KAM) Error	ON
P0606 (0)	———	ECM/PCM Processor Malfunction	ON
P0685 (135)	———	ECM/PCM Power Control Circuit Malfunction	ON
P0700 (70)*·*2	———	Automatic Transaxle System Malfunction	ON
P0700 (—)*·*2	———	Automatic Transaxle System Malfunction	OFF
P0720 (122)*3	———	Countershaft Speed Sensor Circuit Malfunction	ON
P1128 (5)	———	Manifold Absolute Pressure (MAP) Sensor Circuit Lower Than Expected	ON
P1129 (5)	———	Manifold Absolute Pressure (MAP) Sensor Circuit Higher Than Expected	ON
P1157 (48)	———	Air Fuel Ratio (A/F) Sensor (Sensor 1) Line High Voltage	ON
P1297 (20)	———	Electric Load Detector (ELD) Circuit Low Voltage	OFF
P1298 (20)	———	Electric Load Detector (ELD) Circuit High Voltage	OFF
P1454 (91)	P1454	Fuel Tank Pressure (FTP) Sensor Range/Performance Problem	ON
P1683 (40)	———	Throttle Valve Default Position Spring Performance Problem	ON
P1684 (40)	———	Throttle Valve Return Spring Performance Problem	ON
P2101 (40)	———	Throttle Actuator System Malfunction	ON
P2108 (40)	———	Throttle Actuator Control Module Problem	ON
P2118 (40)	———	Throttle Actuator Current Range/Performance Problem	ON
P2122 (37)	———	Accelerator Pedal Position (APP) Sensor A (Throttle Position Sensor D) Circuit Low Voltage	ON
P2123 (37)	———	Accelerator Pedal Position (APP) Sensor A (Throttle Position Sensor D) Circuit High Voltage	ON
P2127 (37)	———	Accelerator Pedal Position (APP) Sensor B (Throttle Position Sensor E) Circuit Low Voltage	ON
P2128 (37)	———	Accelerator Pedal Position (APP) Sensor B (Throttle Position Sensor E) Circuit High Voltage	ON
P2135 (7)	———	Throttle Position (TP) Sensor A/B Incorrect Voltage Correlation	ON
P2138 (37)	———	Accelerator Pedal Position (APP) Sensor A/B (Throttle Position Sensor D/E) Incorrect Voltage Correlation	ON
P2176 (40)	———	Throttle Actuator Control System Idle Position Not Learned	ON

* : The D indicator and MIL may come on simultaneously.
* 1: These DTCs are indicated by a blinking MIL when the SCS line is jumped with the HDS.
* 2: A/T
* 3: M/T
* 4: With Navigation System

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Fig. 10: DTC Troubleshooting Index (2 Of 3)

DTC (MIL indication *1)	Temporary DTC (Temporary)	Detection Item	MIL
P2195 (48)	———	Air Fuel Ratio (A/F) Sensor (Sensor 1) Signal Stuck Lean	ON
P2227 (13)	P2227	Barometric Pressure (BARO) Circuit Range/Performance Problem	ON
P2228 (13)	———	Barometric Pressure (BARO) Sensor Circuit Low Voltage	ON
P2229 (13)	———	Barometric Pressure (BARO) Sensor Circuit High Voltage	ON
P2238 (48)	———	Air Fuel Ratio (A/F) Sensor (Sensor 1) AFS+Line Low Voltage	ON
P2252 (48)	———	Air Fuel Ratio (A/F) Sensor (Sensor 1) AFS−Line Low Voltage	ON
P2279 (109)	P2279	Intake Air System Leak Detected	ON
P2422 (117)	P2422	Evaporative Emission (EVAP) Canister Vent Shut Valve Stuck Closed Malfunction	ON
P2552 (40)	———	Throttle Actuator Control Module Relay Malfunction	ON
P2646 (22)	———	VTEC Oil Pressure Switch Circuit Low Voltage	ON
P2647 (22)	———	VTEC Oil Pressure Switch Circuit High Voltage	ON
P2648 (21)	———	VTEC Solenoid Valve Circuit Low Voltage	ON
P2649 (21)	———	VTEC Solenoid Valve Circuit High Voltage	ON
P2A00 (61)	P2A00	Air Fuel Ratio (A/F) Sensor (Sensor 1) Range/Performance Problem	ON
U0073 (126)	———	FCAN Malfunction (Bus-Off)	OFF
U0107 (30)	———	Lost Communication With Throttle Actuator Control Module	ON
U0122 (126)*4	———	FCAN Malfunction (VSA-ECM/PCM)	ON
U0155 (126)	———	FCAN Malfunction (Gauge Control Module-ECM/PCM)	OFF

* : The D indicator and MIL may come on simultaneously.
* 1: These DTCs are indicated by a blinking MIL when the SCS line is jumped with the HDS.
* 2: A/T
* 3: M/T
* 4: With Navigation System

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Fig. 11: DTC Troubleshooting Index (3 Of 3)

SYMPTOM TROUBLESHOOTING INDEX

When the vehicle has one of these symptoms, check for a diagnostic trouble code (DTC) with the scan tool. If there is no DTC, do the diagnostic procedure for the symptom, in the sequence listed, until you find the cause.

Symptom	Diagnostic procedure	Also check for
Engine will not start (MIL works OK, no DTCs set)	1. Test the battery. 2. Test the starter. 3. Check the fuel pressure. 4. Troubleshoot the fuel pump circuit.	• Low compression • No ignition spark • Intake air leaks • Locked up engine • Broken cam chain • Contaminated fuel
Engine will not start (MIL comes on and stays on, or never comes on at all, no DTCs set)	Troubleshoot the MIL circuit.	
Engine will not start (immobilizer indicator stays on or flashes)	Troubleshoot the immobilizer system.	
Hard starting (MIL works OK, no DTCs set)	1. Test the battery. 2. Check the fuel pressure. 3. Test the throttle body.	• Low compression • Intake air leaks • Contaminated fuel • Weak spark
Cold fast idle too low (MIL works OK, no DTCs set)	1. Do the ECM/PCM idle learn procedure. 2. Check the idle speed.	
Cold fast idle too high (MIL works OK, no DTCs set)	1. Do the ECM/PCM idle learn procedure. 2. Check the idle speed. 3. Inspect/adjust the throttle cable.	
Idle speed fluctuates (MIL works OK, no DTCs set)	1. Do the ECM/PCM idle learn procedure. 2. Check the idle speed. 3. Inspect/adjust the throttle cable. 4. Test the throttle body.	Intake vacuum leaks
After warming up, idle speed is below specification with no load (MIL works OK, no DTCs set)	1. Troubleshoot the alternator FR signal circuit. 2. Test the throttle body.	
After warming up, idle speed is above specification with no load (MIL works OK, no DTCs set)	1. Inspect/adjust the throttle cable. 2. Troubleshoot the alternator FR signal circuit.	
Low power (MIL works OK, no DTCs set)	1. Check the fuel pressure. 2. Inspect/adjust the throttle cable.	• Low compression • Incorrect camshaft timing • Incorrect engine oil level
Engine stalls (MIL works OK, no DTCs set)	1. Do the ECM/PCM idle learn procedure. 2. Check the fuel pressure. 3. Check the idle speed. 4. Troubleshoot the brake pedal position switch signal circuit.	• Intake air leaks • Faulty harness and sensor connections

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Fig. 12: Symptom Troubleshooting Index (1 Of 2)

Symptom	Diagnostic procedure	Also check for
Difficult to refuel (MIL works OK, no DTCs set)	1. Check the fuel vent tube between the EVAP canister and the fuel tank. 2. Check the fuel tank vapor recirculation tube between the fuel pipe and the fuel tank. 3. Replace the fuel tank.	Malfunctioning gas station filling nozzle.
Fuel overflows during refueling (No DTCs set)	Replace the fuel tank.	Malfunctioning gas station filling nozzle.

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Fig. 13: Symptom Troubleshooting Index (2 Of 2)

SYSTEM DESCRIPTIONS

ELECTRONIC CONTROL SYSTEM

The functions of the fuel and emission control systems are managed by the engine control module (ECM) on vehicles with manual transmissions or the powertrain control module (PCM) on vehicles with automatic transmissions.

FAIL-SAFE FUNCTION

When an abnormality occurs in the signal from a sensor, the ECM/PCM ignores that signal and assumes a preprogrammed value for the sensor that allows the engine to continue to run.

BACK-UP FUNCTION

When an abnormality occurs in the ECM/PCM, the injectors are controlled by a back-up circuit independent of the system to permit minimal driving.

SELF-DIAGNOSIS

When an abnormality occurs in the signal from a sensor, the ECM/PCM supplies ground for the malfunction indicator lamp (MIL) and stores the diagnostic trouble code (DTC) in erasable memory. When the ignition is first turned on, the ECM/PCM supplies ground to the MIL for 15 to 20 seconds to check the MIL bulb condition. If all readiness code are not set, the MIL will flash five times. If readiness codes are set to complete, the MIL will go out.

TWO DRIVING CYCLE DETECTION METHOD

To prevent false indications, the "two driving cycle detection method" is used for some self-diagnostic functions. When an abnormality occurs, the ECM/PCM stores it in its memory. When the same abnormality recurs after the ignition switch is turned OFF and ON (II) again, the ECM/PCM turns on the MIL.

SELF SHUT DOWN MODE (SSD)

After the ignition switch is turned off, the ECM/PCM stays ON (up to 15 minutes). If the ECM/PCM connector is disconnected during this mode, the ECM/PCM may be damaged. To cancel this mode, disconnect the negative cable from the battery or jump the SCS line with the HDS after the key is turned off.

ECM/PCM ELECTRICAL CONNECTIONS

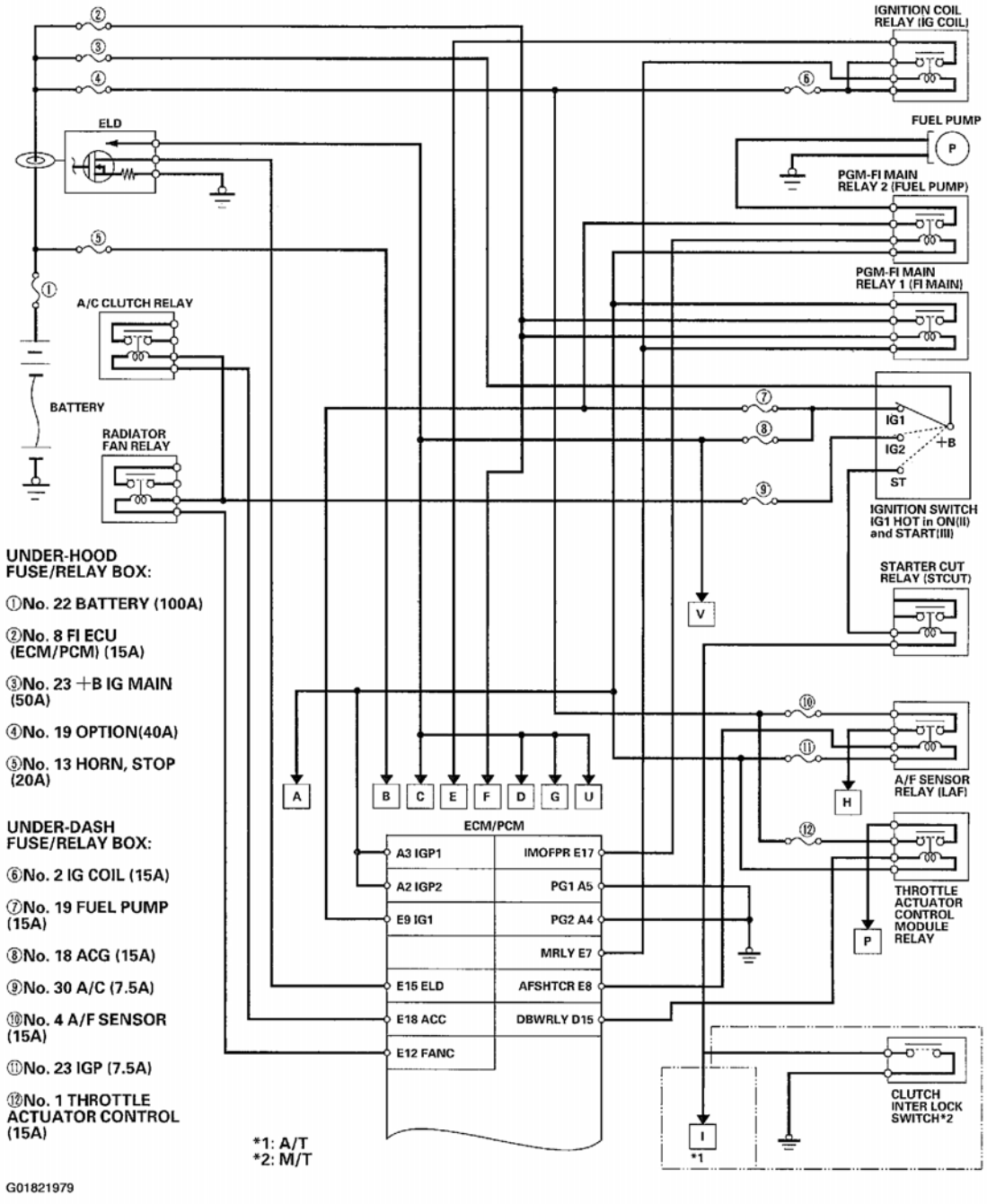

Fig. 14: ECM/PCM Wiring Diagram (1 Of 5)

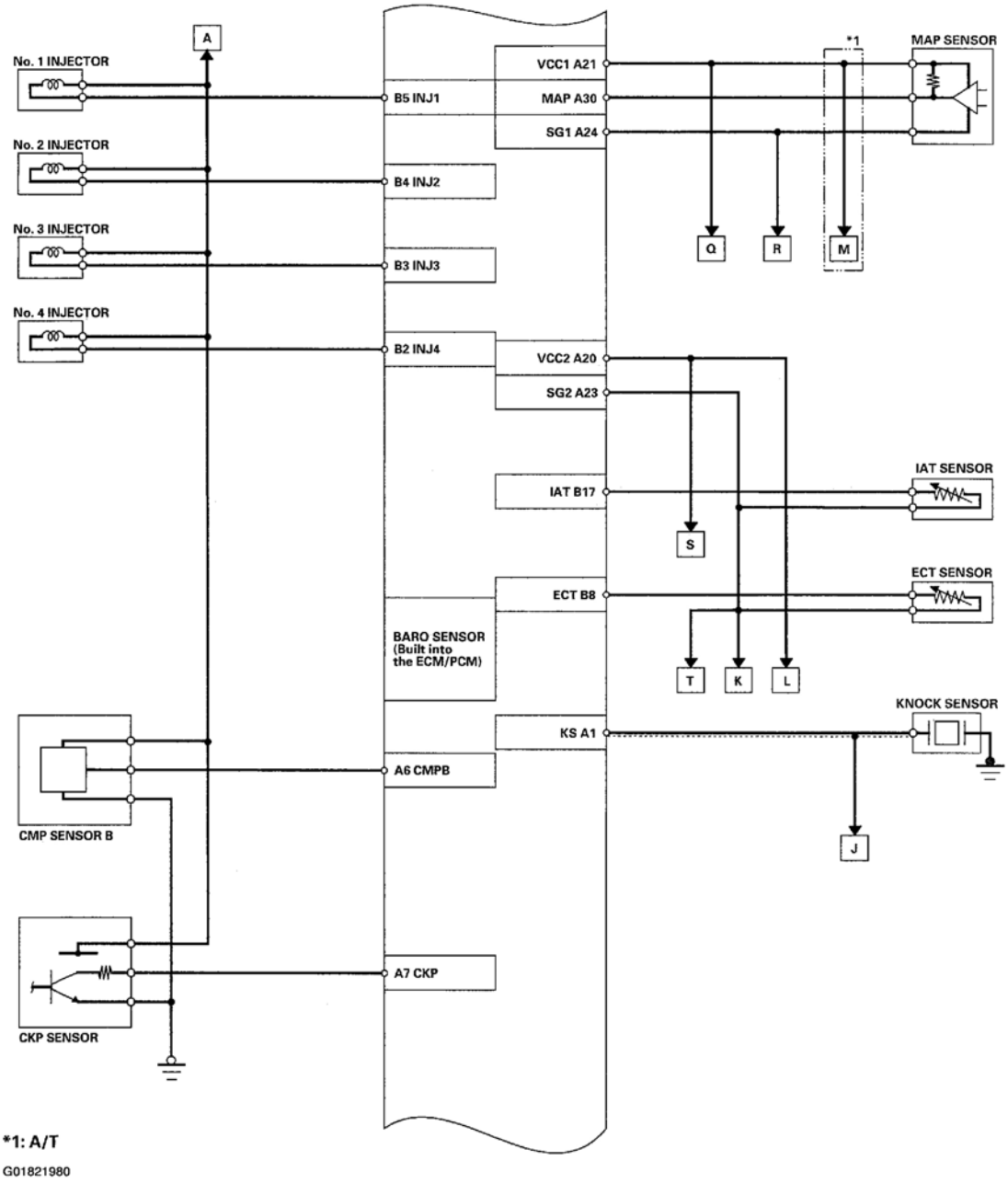

Fig. 15: ECM/PCM Wiring Diagram (2 Of 5)

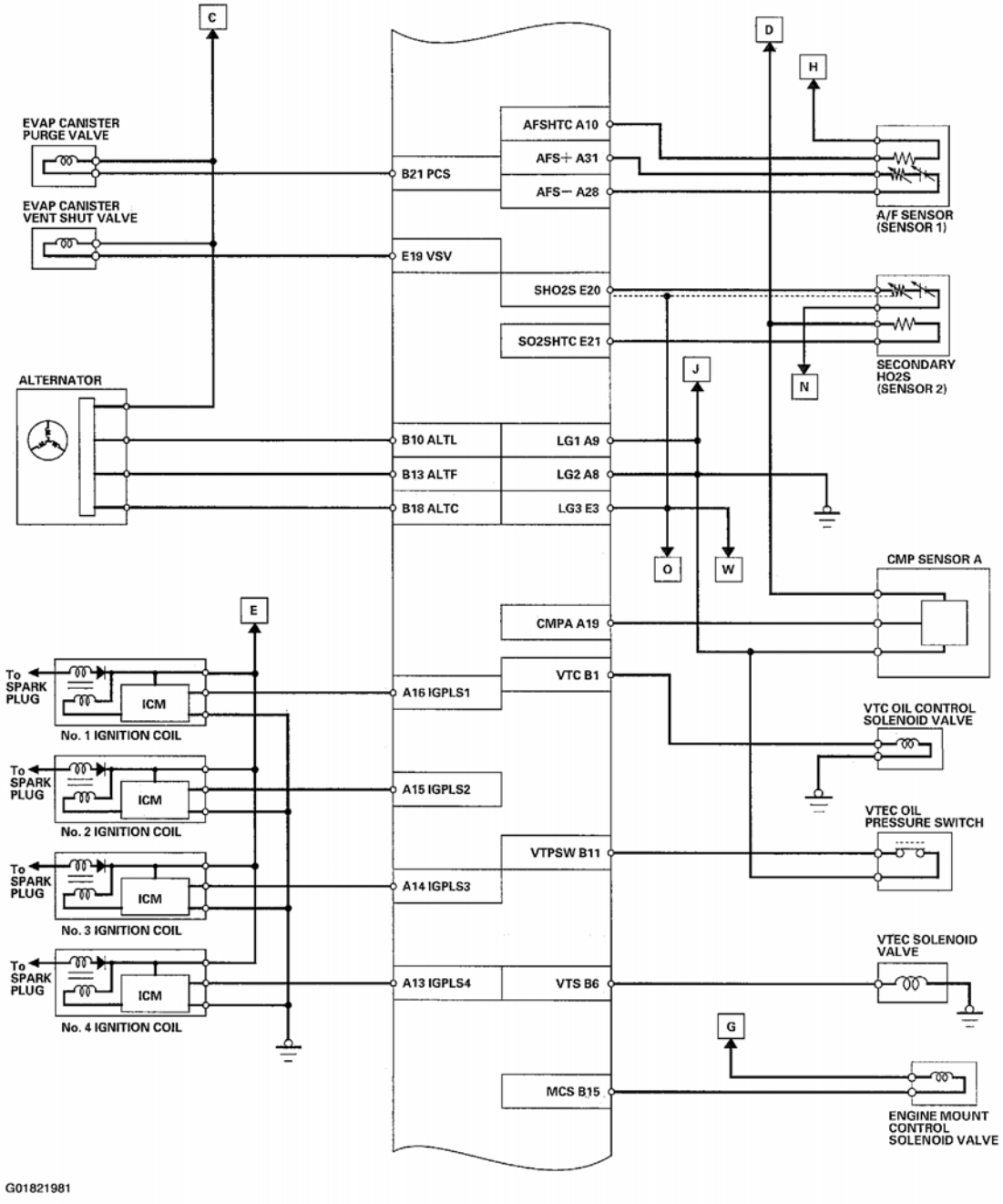

Fig. 16: ECM/PCM Wiring Diagram (3 Of 5)

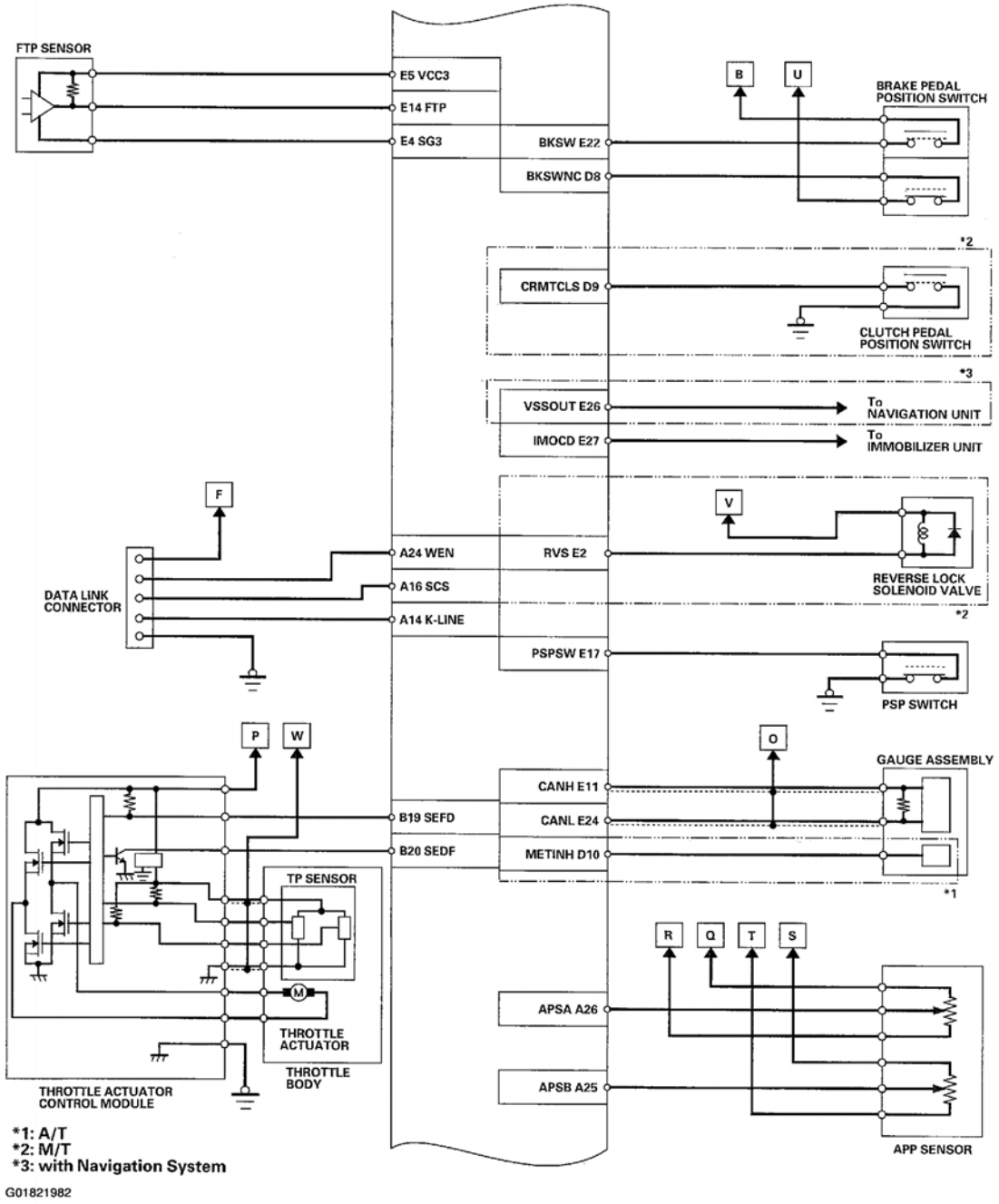

Fig. 17: ECM/PCM Wiring Diagram (4 Of 5)

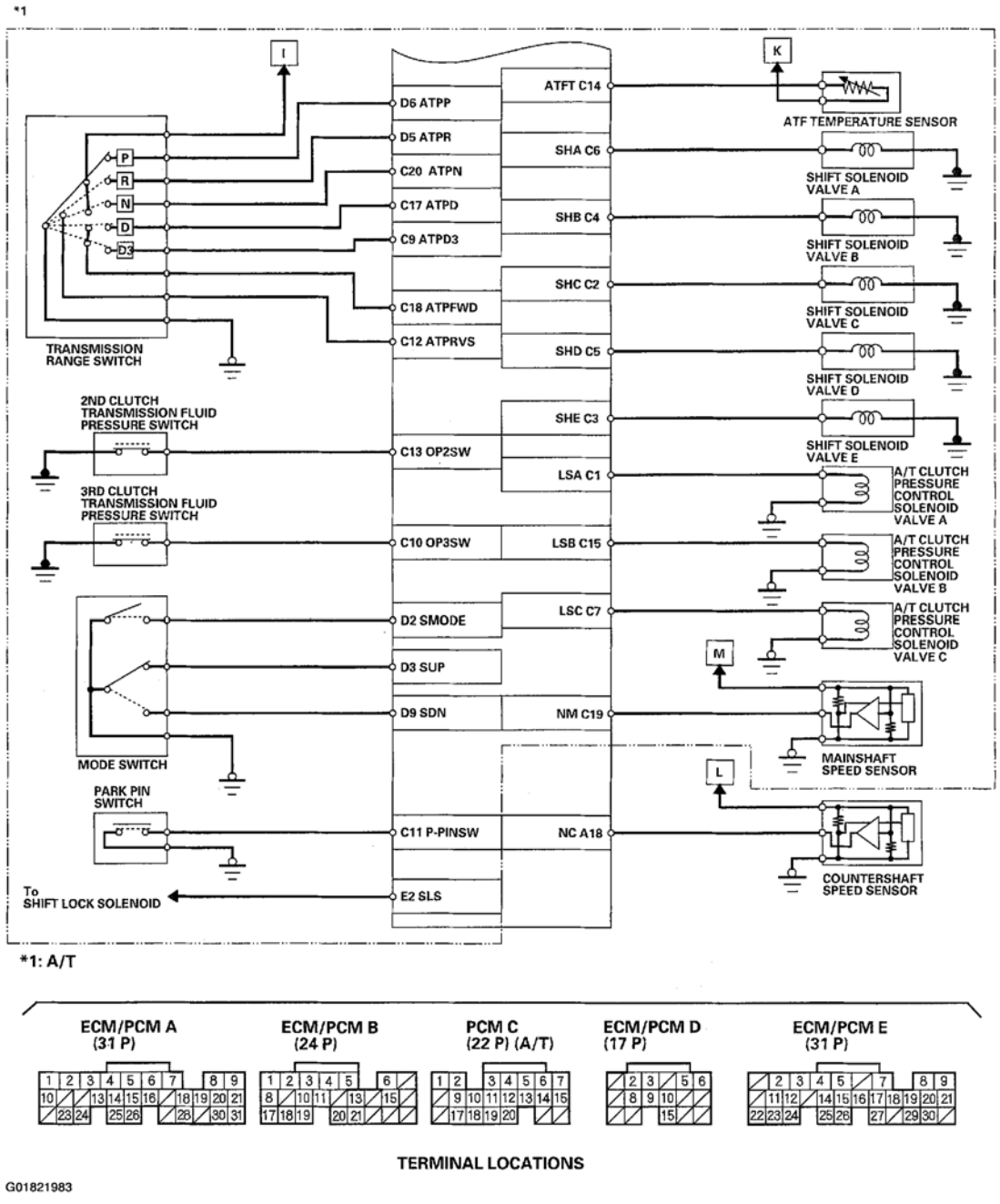

Fig. 18: ECM/PCM Wiring Diagram (5 Of 5)

ECM/PCM INPUTS & OUTPUTS AT CONNECTOR A (31P)

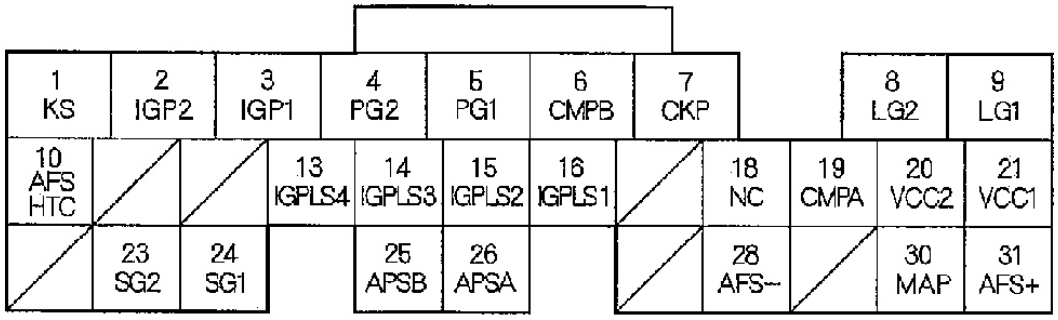

Fig. 19: Identifying ECM/PCM Connector A (31P) Terminals

NOTE: Standard battery voltage is 12 V.

Terminal number	Wire color	Terminal name	Description	Signal
1	RED/BLU	KS (KNOCK SENSOR)	Detects knock sensor signal	With engine knocking: pulses
2	YEL/BLK	IGP2 (POWER SOURCE)	Power source for ECM/PCM circuit	With ignition switch ON (II): battery voltage With ignition switch OFF: about 0 V
3	YEL/BLK	IGP1 (POWER SOURCE)	Power source for ECM/PCM circuit	With ignition switch ON (II): battery voltage With ignition switch OFF: about 0 V
4	BLK	PG2 (POWER GROUND)	Ground circuit for ECM/PCM	Less than 1.0 V at all times
5	BLK	PG1 (POWER GROUND)	Ground circuit for ECM/PCM	Less than 1.0 V at all times
6	GRN	CMPB (CAMSHAFT POSITION SENSOR B)	Detects CMP sensor B signal	With engine running: pulses With the ignition switch ON (II): about 5 V
7	BLU	CKP (CRANKSHAFT POSITION SENSOR)	Detects CKP sensor signal	With engine running: pulses With the ignition switch ON (II): about 5 V
8	BRN/YEL	LG2 (LOGIC GROUND)	Ground circuit for ECM/PCM	Less than 1.0 V at all times
9	BRN/YEL	LG1 (LOGIC GROUND)	Ground circuit for ECM/PCM	Less than 1.0 V at all times
10	GRN	AFSHTC (AIR FUEL RATIO (A/F) SENSOR HEATER CONTROL)	Drives A/F sensor heater	With ignition switch ON (II): battery voltage With fully warmed up engine running: about 0 V
13	BRN	IGPLS4 (No. 4 IGNITION COIL PULSE)	Drives No. 4 ignition coil	With ignition switch ON (II): about 0 V With engine running: pulses
14	WHT/BLU	IGPLS3 (No. 3 IGNITION COIL PULSE)	Drives No. 3 ignition coil	
15	BLU/RED	IGPLS2 (No. 2 IGNITION COIL PULSE)	Drives No. 2 ignition coil	
16	YEL/GRN	IGPLS1 (No. 1 IGNITION COIL PULSE)	Drives No. 1 ignition coil	
18	BLK/BLU	NC (COUNTERSHAFT SPEED SENSOR)	Detects countershaft speed sensor signal	With ignition switch ON (II): about 0 V or about 5 V While driving: about 2.5 V
19	BLU/WHT	CMP A (CAMSHAFT POSITION SENSOR A)	Detects CMP sensor A signal	With engine running: pulses With ignition switch ON (II): about 5 V

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Fig. 20: ECM/PCM Connector A (31P) Pin Voltage Chart (1 Of 2)

Terminal number	Wire color	Terminal name	Description	Signal
20	YEL/BLU	VCC2 (SENSOR VOLTAGE)	Provides sensor voltage	With ignition switch ON (II): about 5 V With ignition switch OFF: about 0 V
21	YEL/RED	VCC1 (SENSOR VOLTAGE)	Provides sensor voltage	With ignition switch ON (II): about 5 V With ignition switch OFF: about 0 V
23	GRN/YEL	SG2 (SENSOR GROUND)	Sensor ground	Less than 1.0 V at all times
24	GRN/WHT	SG1 (SENSOR GROUND)	Sensor ground	Less than 1.0 V at all times
25	RED/YEL	APSB (ACCELERATOR PEDAL POSITION (APP) SENSOR B)	Detects APP sensor B signal	With ignition switch ON (II) and accelerator pedal pressed: about 2.3 V With ignition switch ON (II) and accelerator pedal released: about 0.2 V
26	RED/BLU	APSA (ACCELERATOR PEDAL POSITION (APP) SENSOR A)	Detects APP sensor A signal	With ignition switch ON (II) and accelerator pedal pressed: about 4.5 V With ignition switch ON (II) and accelerator pedal released: about 0.5 V
28	RED/YEL	AFS − (AIR FUEL RATIO (A/F) SENSOR, SENSOR 1 − SIDE)	Detects A/F sensor (sensor 1) signal	
30	GRN/RED	MAP (MANIFOLD ABSOLUTE PRESSURE SENSOR)	Detects MAP sensor signal	With ignition switch ON (II): about 3V At idle: about 1.0 V (depending on engine speed)
31	RED	AFS + (AIR FUEL RATIO (A/F) SENSOR, SENSOR 1 + SIDE)	Detects A/F sensor (sensor 1) signal	

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Fig. 21: ECM/PCM Connector A (31P) Pin Voltage Chart (2 Of 2)

ECM/PCM INPUTS & OUTPUTS AT CONNECTOR B (24P)

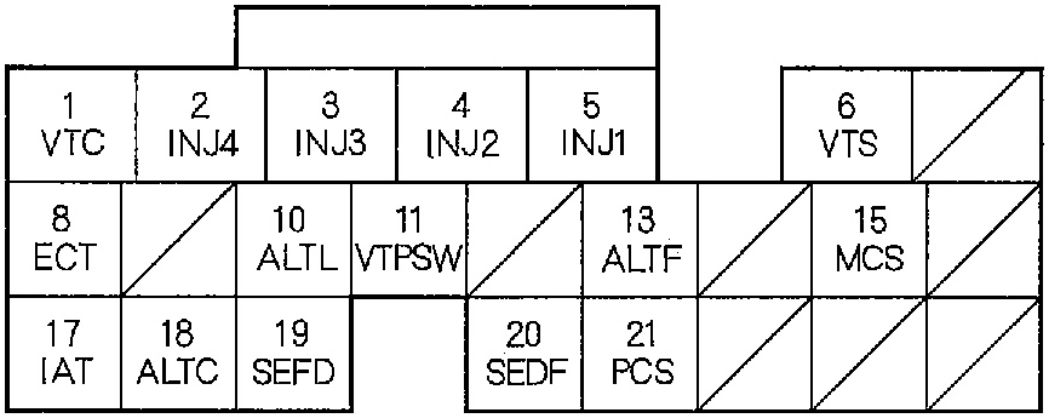

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Fig. 22: Identifying ECM/PCM Connector B (24P) Terminals

NOTE: Standard battery voltage is 12 V.

Terminal number	Wire color	Terminal name	Description	Signal
1	BLU/WHT	VTC (VTC OIL CONTROL SOLENOID VALVE)	Drives VTC oil control solenoid valve	With ignition switch ON (II): 0 V
2	YEL	INJ4 (No. 4 INJECTOR)	Drives No. 4 injector	At idle: duty controlled With ignition switch ON (II): battery voltage
3	BLU	INJ3 (No. 3 INJECTOR)	Drives No. 3 injector	
4	RED	INJ2 (No. 2 INJECTOR)	Drives No. 2 injector	
5	BRN	INJ1 (No. 1 INJECTOR)	Drives No. 1 injector	
6	GRN/YEL	VTS (VTEC SOLENOID VALVE)	Drives VTEC solenoid valve	At idle: about 0 V
8	RED/WHT	ECT (ENGINE COOLANT TEMPERATURE SENSOR)	Detects ECT sensor signal	With ignition switch ON (II): about 0.5 – 4.8 V (depending on engine coolant temperature) With fully warmed up engine: about 0.5 – 0.7 V
10	WHT/BLU	ALTL (ALTERNATOR L SIGNAL)	Detects alternator signal	With ignition switch ON (II): about 0 V With engine running: battery voltage
11	BLU/BLK	VTPSW (VTEC OIL PRESSURE SWITCH)	Detects VTEC oil pressure switch signal	With engine at low speed: about 0 V With engine at high speed: battery voltage
13	WHT/RED	ALTF (ALTERNATOR FR SIGNAL)	Detects alternator FR signal	With engine running: about 0 V – 5 V (depending on electrical load)
15	BLU/YEL	MCS (ENGINE MOUNT CONTROL SOLENOID VALVE)	Drives engine mount control solenoid valve	At idle: about 0 V Above idle: battery voltage With ignition switch ON (II): battery voltage
17	RED/YEL	IAT (INTAKE AIR TEMPERATURE SENSOR)	Detects IAT sensor signal	With ignition switch ON (II): about 0.5 V – 4.8 V (depending on intake air temperture)
18	WHT/GRN	ALTC (ALTERNATOR CONTROL)	Sends alternator control signal	With engine running and fully warmed up: about 8 V
19	GRN	SEFD (THROTTLE ACTUATOR CONTROL SERIAL SIGNAL)	Sends throttle actuator control serial signal	
20	BLU	SEDF (THROTTLE ACTUATOR CONTROL SERIAL SIGNAL)	Detects throttle actuator control serial signal	
21	YEL/BLU	PCS (EVAPORATIVE EMISSION CANISTER PURGE VALVE)	Drives EVAP canister purge valve	With engine running, engine coolant below 131°F (55°C): battery voltage With engine running, engine coolant above 131°F (55°C): duty controlled

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Fig. 23: ECM/PCM Connector B (24P) Pin Voltage Chart

PCM INPUTS & OUTPUTS AT CONNECTOR C (22P)

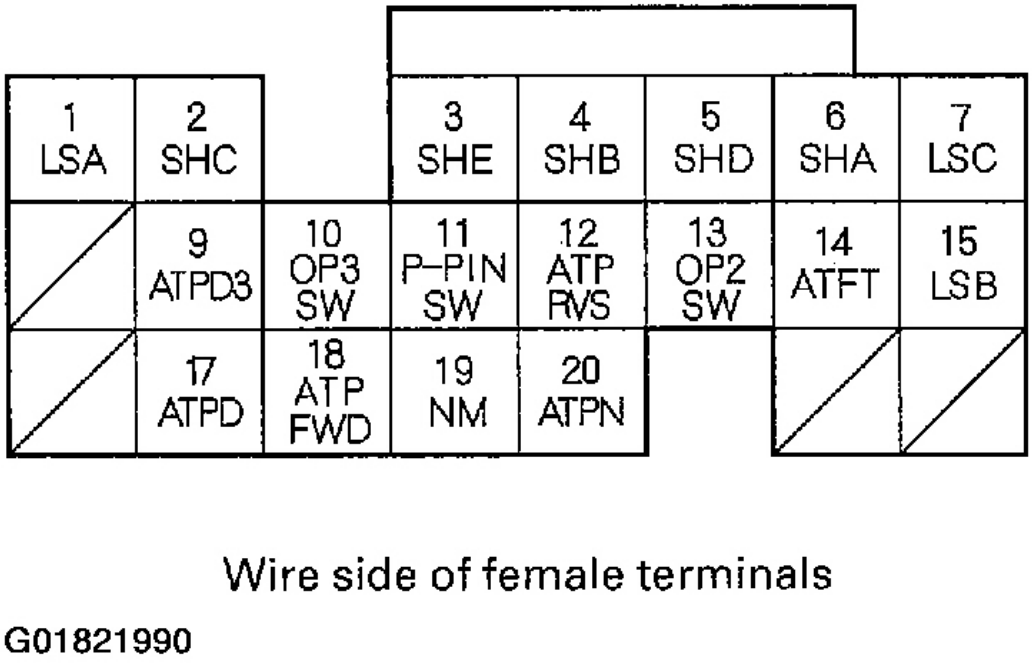

Fig. 24: Identifying ECM/PCM Connector C (22P) Terminals

NOTE: Standard battery voltage is 12 V.

Terminal number	Wire color	Terminal name	Description	Signal
1*1	RED/BLK	LSA (A/T CLUTCH PRESSURE CONTROL SOLENOID VALVE A)	Drives A/T clutch pressure control solenoid valve A	With ignition switch ON (II): duty controlled
2*1	GRN	SHC (SHIFT SOLENOID VALVE C)	Drives shift solenoid valve C	With engine running in Neutral and R position, or in D, D3 and M position (in 1st, 3rd and 5th gears): battery voltage With engine running in Park, R position, or D, D3 and M position (in 2nd, 4th gears): about 0 V
3*1	YEL	SHE (SHIFT SOLENOID VALVE E)	Drives shift solenoid valve E	With engine running in Park, R position: battery voltage With engine running in Neutral, R position, or in D, D3, and M position: about 0 V
4*1	GRN/WHT	SHB (SHIFT SOLENOID VALVE B)	Drives shift solenoid valve B	With engine running in Park, R, Neutral, or D, D3 and M position (in 1st, 2nd gears): battery voltage With engine running in R or D, D3 and M position (in 3rd, 4th, 5th gears): about 0 V
5*1	GRN/RED	SHD (SHIFT SOLENOID VALVE D)	Drives shift solenoid valve D	With engine running in 2 or D, D3 and M position (in 2nd, 5rd gears): battery voltage With engine running in Park, R, Neutral, or D, D3 and M position (in 1st, 3rd, 4th, gears): about 0 V
6*1	BLU/BLK	SHA (SHIFT SOLENOID VALVE A)	Drives shift solenoid valve A	With engine running in R , or D, D3 and M position (in 1st, 4th, 5th gears): battery voltage With engine running in Park, Neutral and R position, or D, D3 and M position (in 2nd, 3rd gears): about 0 V
7*1	BLU/YEL	LSC (A/T CLUTCH PRESSURE CONTROL SOLENOID VALVE C)	Drivers A/T clutch pressure control solenoid valve C	With the ignition switch ON (II): duty controlled
9*1	RED	ATPD3 (TRANSMISSION RANGE SWITCH D3 POSITION)	Detects transmission range switch D3 position signal input	In D3 position: about 0 V In any other position: about 5 V
10*1	BLU/WHT	OP3SW (3RD CLUTCH TRANSMISSION FLUID PRESSURE SWITCH)	Detects 3rd clutch transmission fluid pressure switch signal output	With ignition switch ON (II): about 5 V With 3rd clutch pressure: 0 V
11*1	BLU/YEL	P-PINSW (PARK PIN SWITCH)	Detects park pin switch signal	With park pin switch ON (II): about 0 V With park pin switch OFF: about 5 V
12*1	RED/WHT	ATPRVS (TRANSMISSION RANGE SWITCH R POSITION)	Detects transmission range switch R position signal input	In R position: about 0 V In any other position: about 5 V
13*1	BLU/RED	OP2SW (2ND CLUTCH TRANSMISSION FLUID PRESSURE SWITCH)	Detects 2nd clutch transmission fluid pressure switch signal input	With ignition switch ON (II): about 5 V With 2nd clutch pressure: 0 V
14*1	RED/YEL	ATFT (ATF TEMPERATURE SENSOR)	Detects ATF temperature sensor signal input	With ignition switch ON (II): about 0.2 V—3 V (depending on ATF temperature)

* 1: A/T

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Fig. 25: ECM/PCM Connector C (22P) Pin Voltage Chart (1 Of 2)

Terminal number	Wire color	Terminal name	Description	Signal
15*1	BRN/WHT	LSB (A/T CLUTCH PRESSURE CONTROL SOLENOID VALVE B)	Drives A/T clutch pressure control solenoid valve B	With ignition switch ON (II): duty controlled
17*1	YEL/GRN	ATPD (TRANSMISSION RANGE SWITCH D POSITION)	Detects transmission range switch D position signal	In D position: about 0 V In any other position: about 5V
18*1	BLU/YEL	ATPFWD (TRANSMISSION RANGE SWITCH D/D3 POSITION)	Detects transmission range switch D, D3 position signal	In D, D3 position: about 0 V In any other position: about 5 V
19*1	WHT/RED	NM (MAINSHAFT SPEED SENSOR)	Detects mainshaft speed sensor signal	With ignition switch ON (II): about 0 V or about 5 V With engine running in N position: about 2.5 V
20*1	RED/BLK	ATPN (TRANSMISSION RANGE SWITCH NEUTRAL POSITION)	Detects transmition range switch Neutral position signal	In Neutral position: about 0 V In any other position: about 5 V

* 1: A/T

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Fig. 26: ECM/PCM Connector C (22P) Pin Voltage Chart (2 Of 2)

ECM/PCM INPUTS & OUTPUTS AT CONNECTOR D (17P)

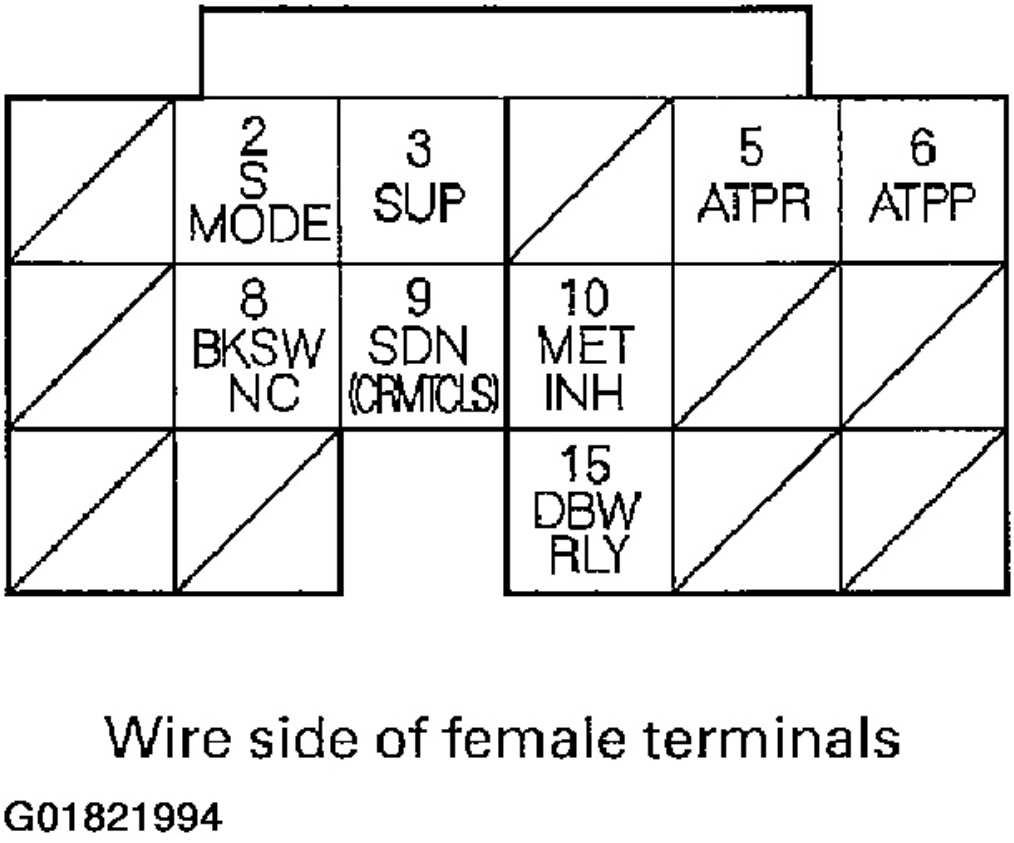

Fig. 27: Identifying ECM/PCM Connector D (17P) Terminals

NOTE: Standard battery voltage is 12 V.

Terminal number	Wire color	Terminal name	Description	Signal
2*1	BRN	S MODE (SEQUENTIAL SPORT SHIFT MODE)	Detects sequential sportshift mode switch signal	In M position: 0 V In other than M position: about 5 V
3*1	WHT/BLU	SUP (UP SHIFT SWITCH)	Detects upshift switch signal	In M position and shift lever pushed toward upshift position: 0 V In M position and shift lever in neutral position: about 5 V
5*1	WHT	ATPR (TRANSMISSION RANGE SWITCH R POSITION)	Detects transmission range switch R position signal	In R position: about 0 V In any other position: about 5 V
6*1	BLU/BLK	ATPP (TRANSMISSION RANGE SWITCH PARK POSITION)	Detects transmission range switch Park position signal	In Park position: about 0 V In any other position: about 5 V
8	BRN	BKSWNC (BRAKE PEDAL POSITION SWITCH)	Detects brake pedal position switch signal	With ignition switch ON (II) and brake pedal released: battery voltage With ignition switch ON (II) and brake pedal pressed: about 0 V
9*1	ORN	SDN (DOWN SHIFT SWITCH)	Detects downshift switch signal	In M position and shift lever pushed toward downshift position: 0 V In M position and shift lever in neutral position: about 5 V
9*2	LT BLU	CRMTCLS (CRUISE CLUTCH PEDAL POSITION SIGNAL)	Detects cruise clutch pedal position switch signal	With ignition switch ON (II) and clutch pedal released: about 0 V With ignition switch ON (II) and clutch pedal pressed: battery voltage
10*1	LT GRN	METINH (METER DISPLAY INHIBIT SIGNAL)	Send inhibit signal	With ignition switch ON (II): battery voltage
15	BRN	DBWRLY (THROTTLE ACTUATOR CONTROL MODULE RELAY)	Drives throttle actuator control module relay	With ignition switch ON (II): 0 V

* 1: A/T
* 2: M/T

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Fig. 28: ECM/PCM Connector D (17P) Pin Voltage Chart

ECM/PCM INPUTS & OUTPUTS AT CONNECTOR E (31P)

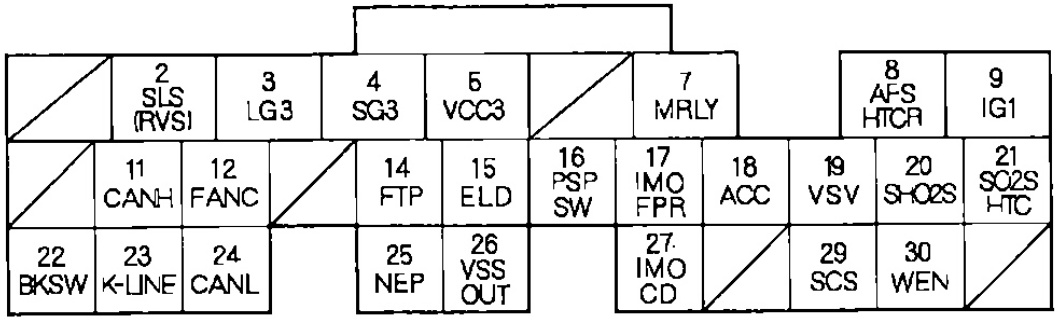

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Fig. 29: Identifying ECM/PCM Connector E (31P) Terminals

NOTE: Standard battery voltage is 12 V.

Terminal number	Wire color	Terminal name	Description	Signal
2*1	YEL/BLK	SLS (SHIFT LOCK SOLENOID)	Drives shift lock solenoid	With ignition switch ON (II), in the Park position, brake pedal pressed, and accelerator released: 0 V
2*2	GRY	RVS (REVERSE LOCK SOLENOID VALVE)	Drives reverse lock solenoid valve	With vehicle speed below 9.4 mph (15 km/h): battery voltage With vehicle speed above 12.5 mph (20 km/h): 0 V
3	BRN/YEL	LG3 (LOGIC GROUND)	Ground for ECM/PCM control circuit	Less than 1.0 V at all times
4	GRN/BLK	SG3 (SENSOR GROUND)	Sensor ground	Less than 1.0 V at all times
5	YEL/GRN	VCC3 (SENSOR VOLTAGE)	Provides sensor voltage	With ignition switch ON (II): about 5 V With ignition switch OFF: about 0 V
7	RED/YEL	MRLY (PGM-FI MAIN RELAY)	Drives PGM-FI main relay 1 (FI MAIN) Power source for DTC memory	With ignition switch ON (II): about 0 V With ignition switch OFF: battery voltage
8	ORN	AFSHTCR (AIR FUEL RATIO (A/F) SENSOR HEATER CONTROL RELAY)	Drives A/F sensor heater relay	With ignition switch ON (II): 0 V
9	BLK/YEL	IG1 (IGNITION SIGNAL)	Detects ignition signal	With ignition switch ON (II): battery voltage With ignition switch OFF: about 0 V
11	WHT	CAN H (CAN COMMUNICATION SIGNAL HIGH)	Sends communication signal	With ignition switch ON (II): pulses
12	GRN	FANC (RADIATOR FAN CONTROL)	Drives radiator fan relay	With radiator fan running: about 0 V With radiator fan stopped: battery voltage
14	LT GLN	FTP (FUEL TANK PRESSURE (FTP) SENSOR)	Detects FTP sensor signal	With ignition switch ON (II) and fuel fill cap open: about 2.5 V
15	BLU/BLK	ELD (ELECTRICAL LOAD DETECTOR)	Detects ELD signal	With ignition switch ON (II): about 0.1 V−4.8 V (depending on electrical load)
16	BLU/YEL	PSPSW (POWER STEERING PRESSURE SWITCH SIGNAL)	Detects PSP switch signal	At idle with steering wheel straight ahead: 0 V At idle with steering wheel at full lock: battery voltage
17	GRN/YEL	IMO FPR (IMMOBILIZER FUEL PUMP RELAY)	Drives PGM-FI main relay 2 (FUEL PUMP)	0 V for 2 seconds after turning ignition switch ON (II), then battery voltage
18	RED	ACC (A/C CLUTCH RELAY)	Drives A/C clutch relay	With compressor ON: about 0 V With compressor OFF: battery voltage
19	LT GRN/RED	VSV (EVAPORATIVE EMISSION (EVAP) CANISTER VENT SHUT VALVE)	Drives EVAP canister vent shut valve	With ignition switch ON (II): battery voltage
20	WHT/RED	SHO2S (SECONDARY HEATED OXYGEN SENSOR (SECONDAY HO2S), SENSOR 2)	Detects secondary HO2S (sensor 2) signal	With throttle fully closed at idle and fully warmed up engine: above 0.6 V With throttle quickly closed: below 0.4 V
21	BLK/WHT	SO2SHTC (SECONDARY HEATED OXYGEN SENSOR (SECONDAY HO2S) HEATER CONTROL)	Drives secondary HO2S heater	With ignition switch ON (II): battery voltage With fully warmed up engine running: duty controlled

* 1: A/T
* 2: M/T

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Fig. 30: ECM/PCM Connector E (31P) Pin Voltage Chart (1 Of 2)

Terminal number	Wire color	Terminal name	Description	Signal
22	WHT/BLK	BKSW (BRAKE PEDAL POSITION SWITCH)	Detects brake pedal position switch signal	With brake pedal released: about 0 V With brake pedal pressed: battery voltage
23	BLU	K-LINE	Sends and receives scan tool signals	With ignition switch ON (II): pulses or battery voltage
24	RED	CANL (CAN COMMUNICATION SIGNAL LOW)	Sends the communication signal	With ignition switch ON (II): pulses
25	BLU	NEP(ENGINE SPEED PULSE)	Outputs engine speed pulse	Not functional on U.S. and Canada models
26	BLU/WHT	VSSOUT (VEHICLE SPEED SENSOR OUTPUT SIGNAL)	Sends vehicle speed sensor signal	Depending on vehicle speed: pulses With ignition switch ON (II): battery voltage
27	RED/BLU	IMOCD (IMMOBILIZER CODE)	Detects immobilizer signal	
29	BRN	SCS (SERVICE CHECK SIGNAL)	Detects service check signal	With the service check signal shorted using HDS: about 0 V With the service check signal open: about 5 V
30	RED/WHT	WEN (WRITE ENABLE SIGNAL)	Detects write enable signal	With ignition switch ON (II): about 0 V

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Fig. 31: ECM/PCM Connector E (31P) Pin Voltage Chart (2 Of 2)

VACUUM HOSE ROUTING

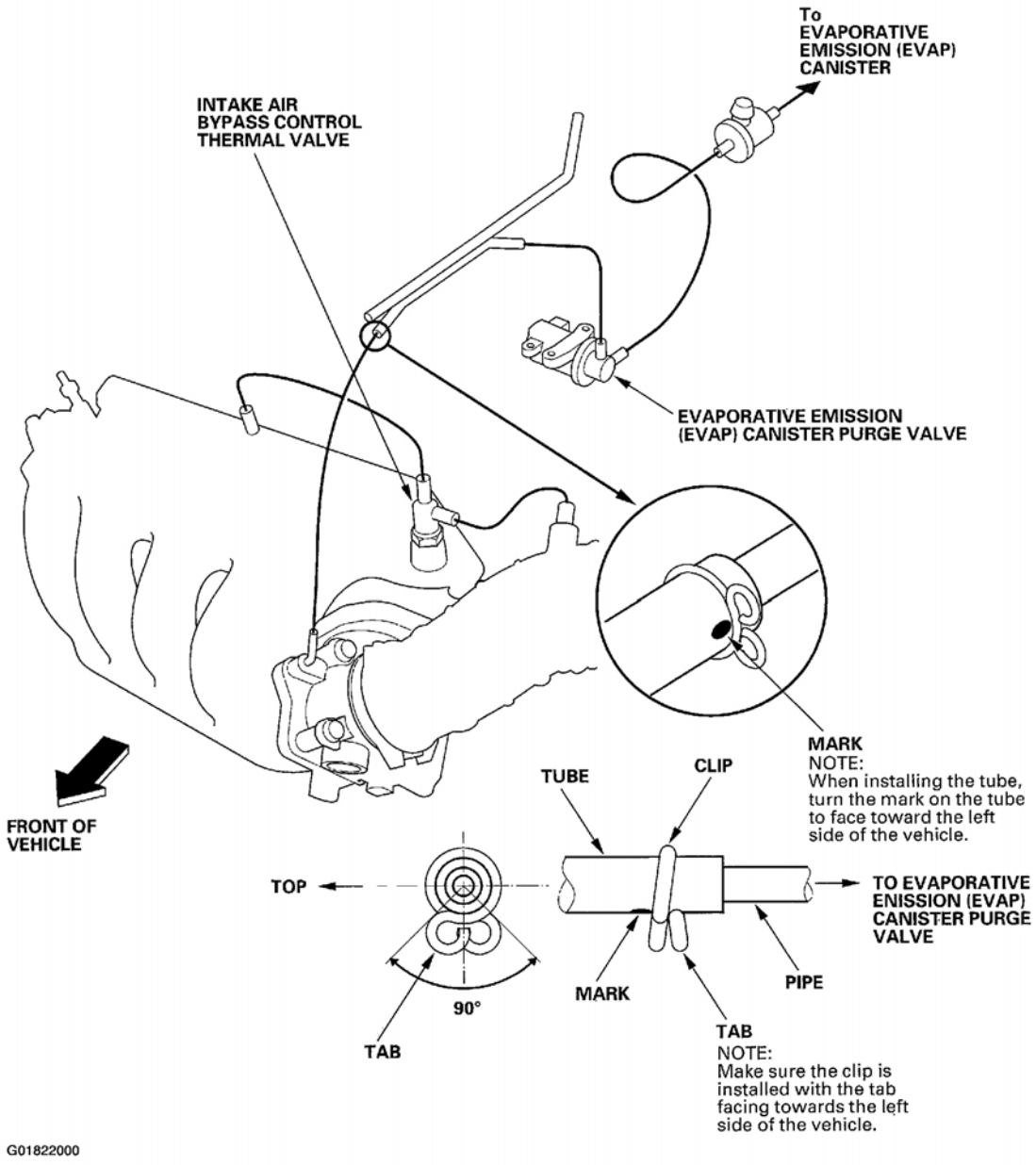
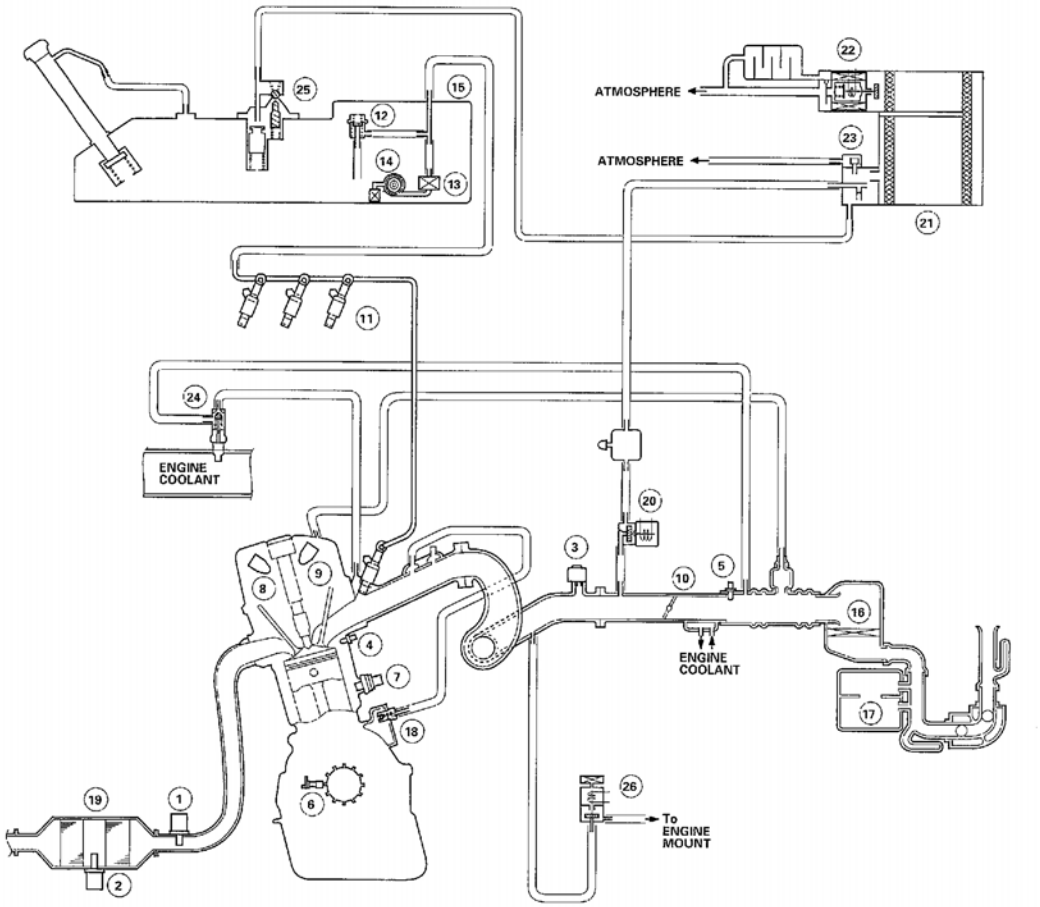


Fig. 32: Vacuum Hose Routing

VACUUM DISTRIBUTION



① AIR FUEL RATIO (A/F) SENSOR (SENSOR 1)
② SECONDARY HEATED OXYGEN SENSOR (SECONDARY HO2S) (SENSOR 2)
③ MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR
④ ENGINE COOLANT TEMPERATURE (ECT) SENSOR
⑤ INTAKE AIR TEMPERATURE (IAT) SENSOR
⑥ CRANKSHAFT POSITION (CKP) SENSOR
⑦ KNOCK SENSOR
⑧ CAMSHAFT POSITION (CMP) SENSOR B
⑨ CAMSHAFT POSITION (CMP) SENSOR A
⑩ THROTTLE BODY
⑪ INJECTOR
⑫ FUEL PRESSURE REGULATOR
⑬ FUEL FILTER
⑭ FUEL PUMP
⑮ FUEL TANK
⑯ AIR CLEANER
⑰ RESONATOR
⑱ POSITIVE CRANKCASE VENTILATION (PCV) VALVE
⑲ THREE WAY CATALYTIC CONVERTER
⑳ EVAPORATIVE EMISSION (EVAP) CANISTER PURGE VALVE
㉑ EVAPORATIVE EMISSION (EVAP) CANISTER
㉒ EVAPORATIVE EMISSION (EVAP) CANISTER VENT SHUT VALVE
㉓ FUEL TANK PRESSURE (FTP) SENSOR
㉔ INTAKE AIR BYPASS CONTROL THERMAL VALVE
㉕ FUEL TANK VAPOR CONTROL VALVE
㉖ ENGINE MOUNT CONTROL SOLENOID VALVE

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Fig. 33: Vacuum Distribution

PGM-FI SYSTEM

The Programmed Fuel Injection (PGM-FI) system is a sequential multiport fuel injection system.

AIR CONDITIONING (A/C) COMPRESSOR CLUTCH RELAY

When the ECM/PCM receives a demand for cooling from the A/C system, it delays the compressor from being

energized, and enriches the mixture to assure smooth transition to the A/C mode.

AIR FUEL RATIO (A/F) SENSOR

The A/F Sensor operates over a wide air/fuel range. The A/F Sensor is installed upstream of the TWC, and sends signals to the ECM/PCM which varies the duration of fuel injection accordingly.

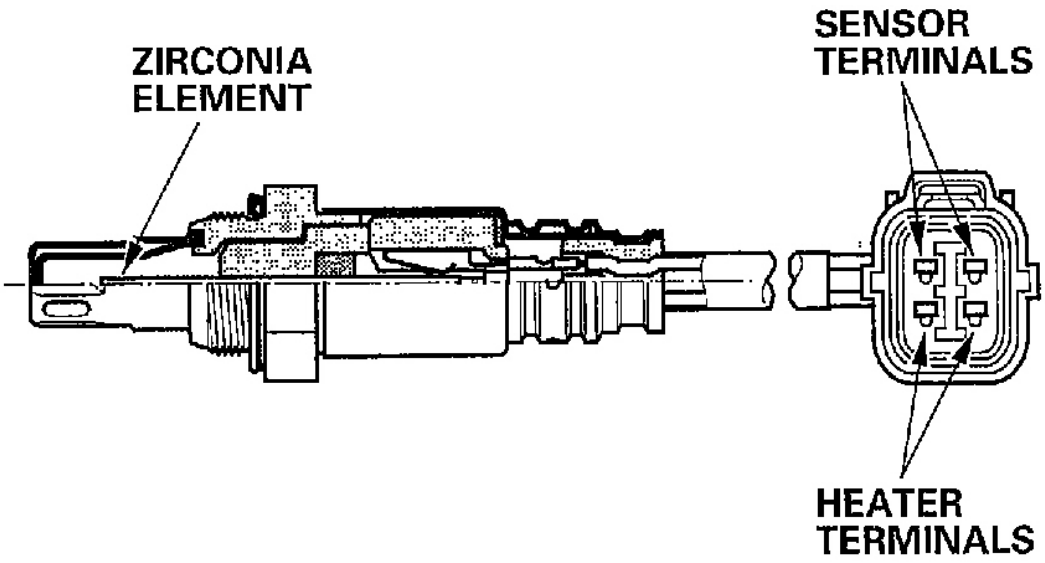

Fig. 34: Identifying Air Fuel Ratio (A/F) Sensor

BAROMETRIC PRESSURE (BARO) SENSOR

The BARO sensor is inside the ECM/PCM. It converts atmospheric pressure into a voltage signal that modifies the basic duration of the fuel injection discharge.

CAMSHAFT POSITION (CMP) SENSOR B

CMP sensor B detects the position of the No. 1 cylinder as a reference for sequential fuel injection to each cylinder.

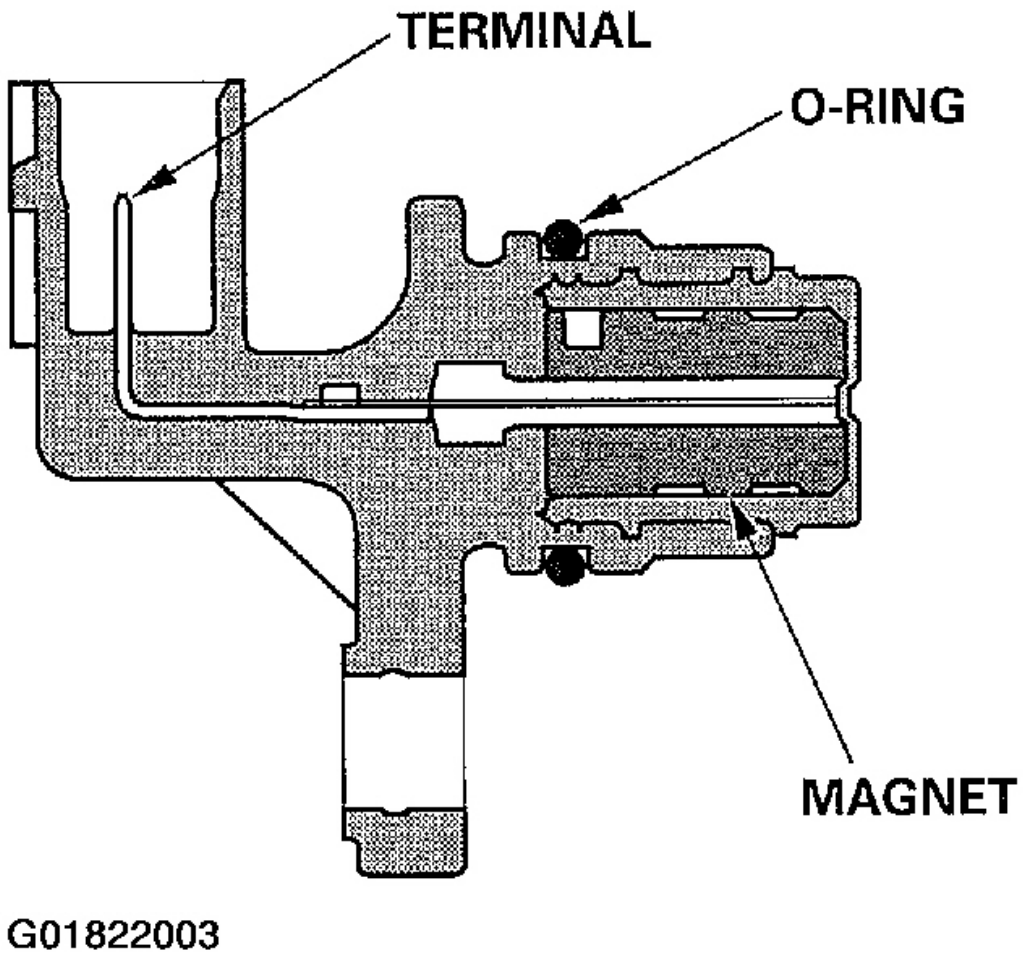

Fig. 35: Cutaway View Of Camshaft Position (CMP) Sensor B

COUNTERSHAFT SPEED SENSOR

This sensor detects countershaft speed.

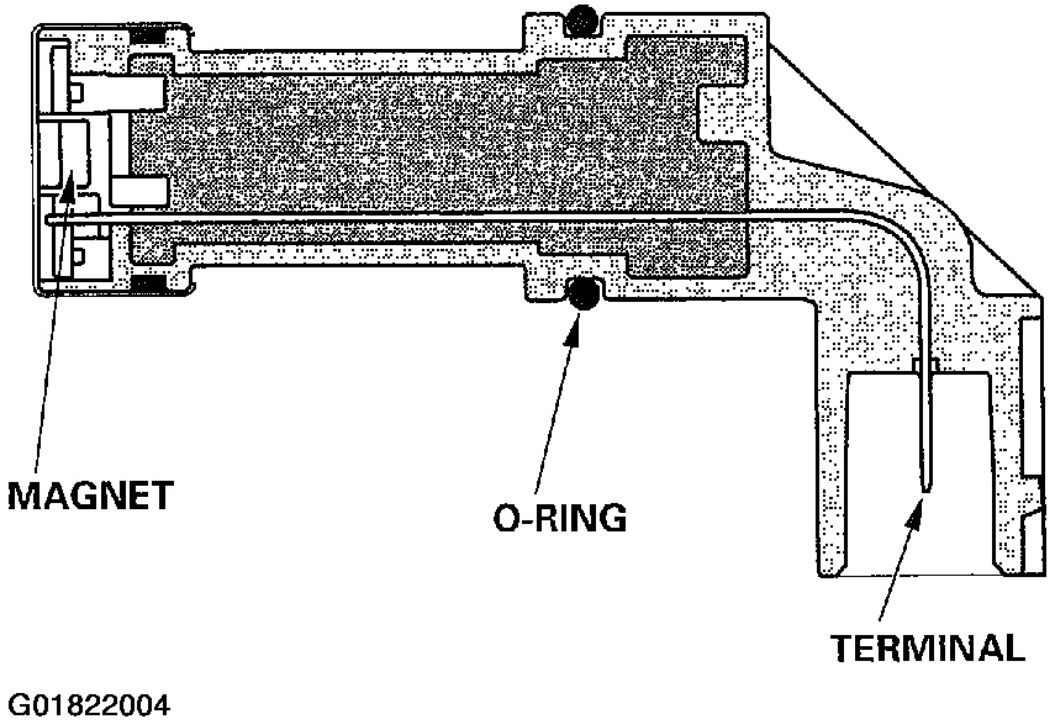

Fig. 36: Cutaway View Of Countershaft Speed Sensor

CRANKSHAFT POSITION (CKP) SENSOR

The CKP sensor detects crankshaft speed and is used by the ECM/PCM to determine ignition timing and timing for fuel injection of each cylinder as well as detecting engine misfire.

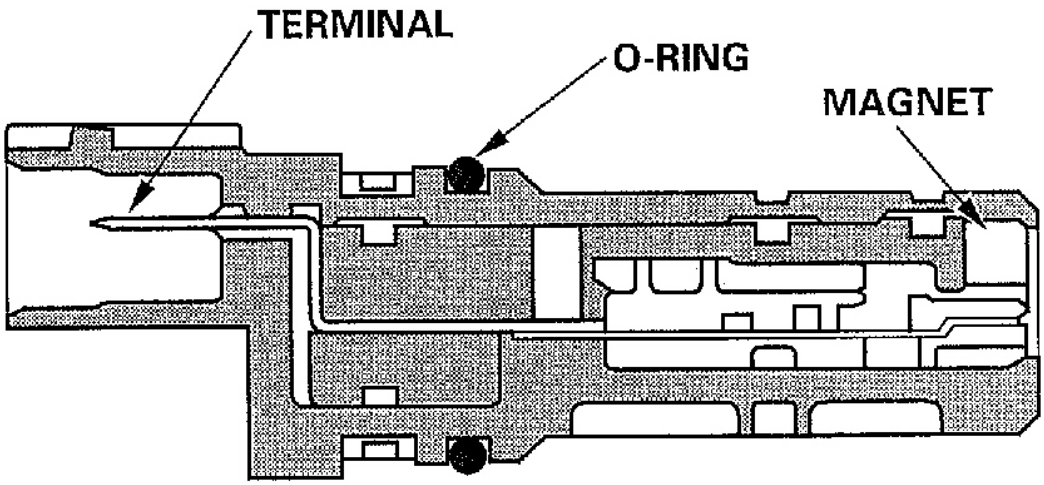

Fig. 37: Cutaway View Of Crankshaft Position (CKP) Sensor

ENGINE COOLANT TEMPERATURE (ECT) SENSOR

The ECT sensor is a temperature dependent resistor (thermistor). The resistance of the thermistor decreases as the engine coolant temperature increases.

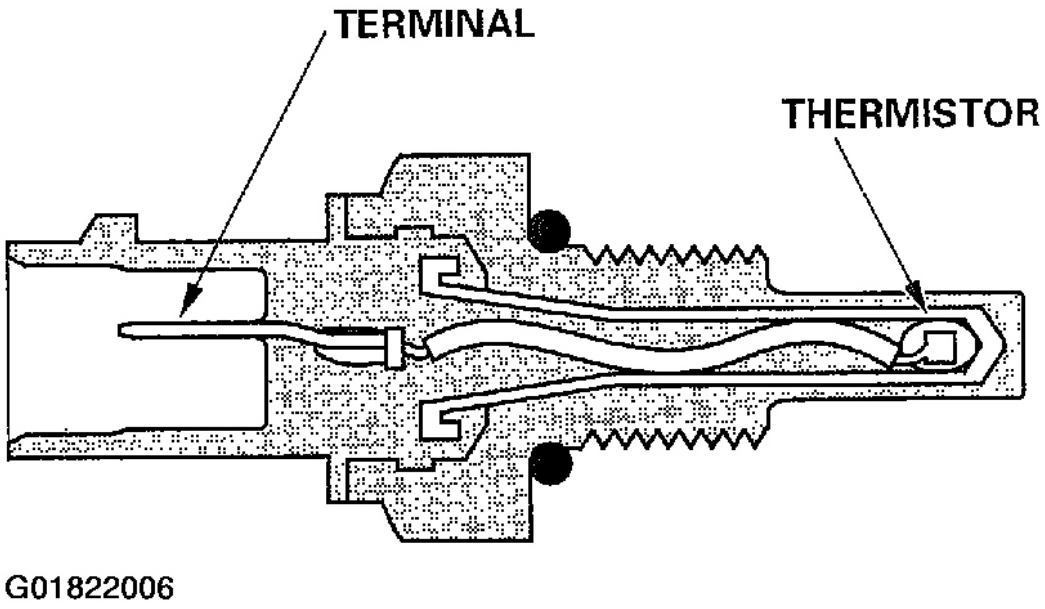

Fig. 38: Cutaway View Of Engine Coolant Temperature (ECT) Sensor

IGNITION TIMING CONTROL

The ECM/PCM contains the memory for basic ignition timing at various engine speeds and manifold absolute pressure. It also adjusts the timing according to engine coolant temperature and intake air temperature.

INJECTOR TIMING & DURATION

The ECM/PCM contains the memory for basic discharge duration at various engine speeds and manifold pressures. The basic discharge duration, after being read out from the memory, is further modified by signals sent from various sensors to obtain the final discharge duration.

By monitoring long term fuel trim, the ECM/PCM detects long term malfunctions in the fuel system and sets a diagnostic trouble code (DTC).

INTAKE AIR TEMPERATURE (IAT) SENSOR

The IAT sensor is a temperature dependent resistor (thermistor). The resistance of the thermistor decreases as the intake air temperature increases.

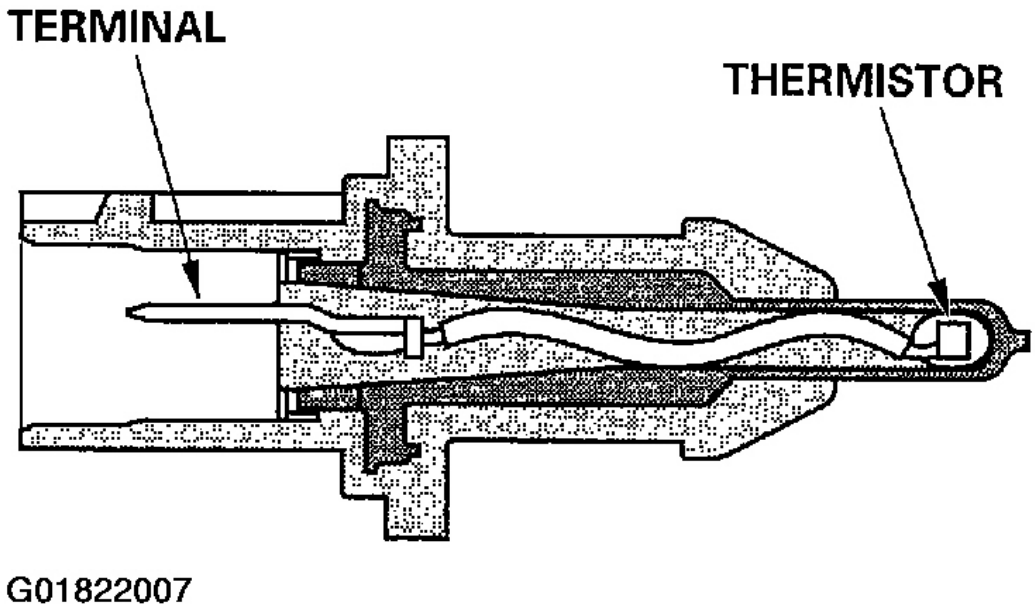

Fig. 39: Cutaway View Of Intake Air Temperature (IAT) Sensor

KNOCK SENSOR

The knock control system adjusts the ignition timing to minimize knock.

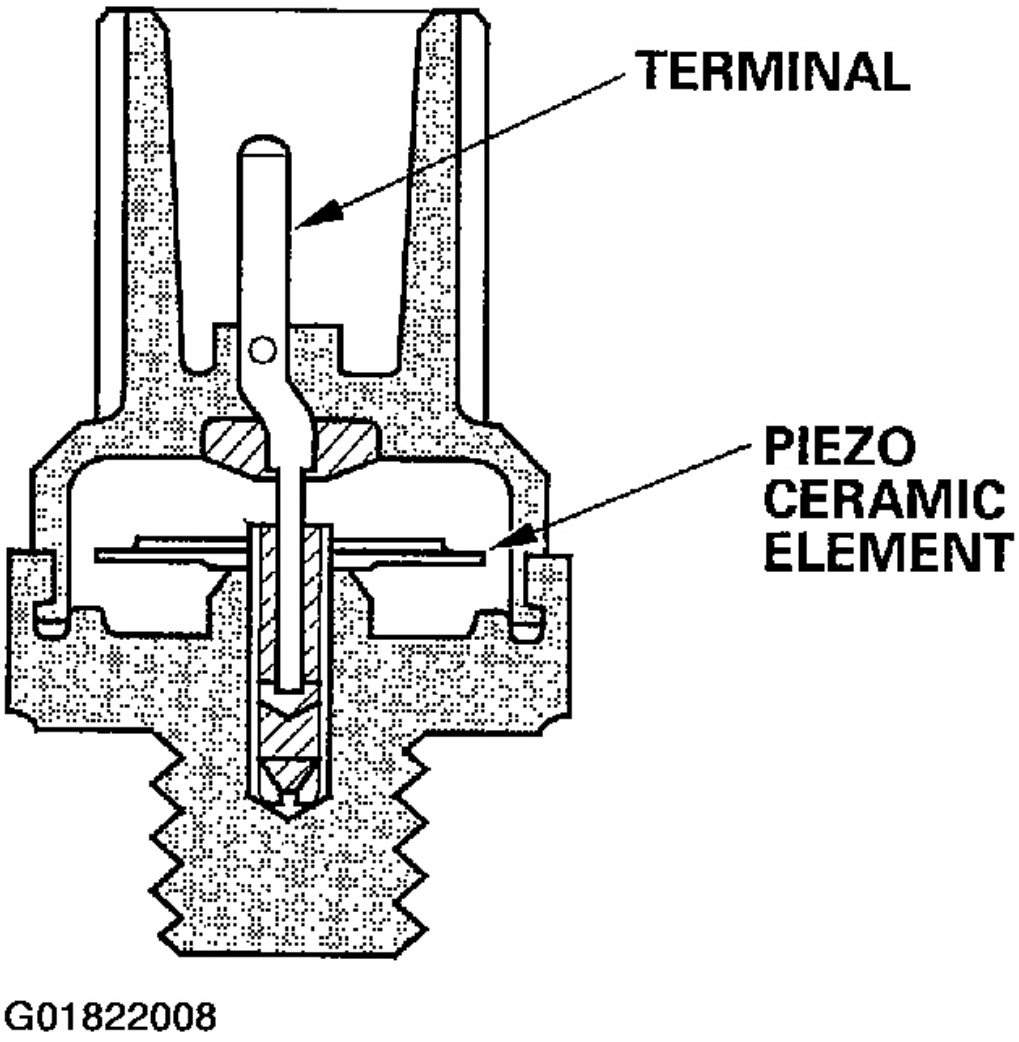

Fig. 40: Cutaway View Of Knock Sensor

MALFUNCTION INDICATOR LAMP (MIL) INDICATION (IN RELATION TO READINESS CODES)

The vehicle has certain "readiness codes" that are part of the on-board diagnostics for the emissions systems. If the vehicle's battery has been disconnected or gone dead, if the DTCs have been cleared, or if the ECM/PCM has been reset, these codes are reset. In some states, part of the emissions testing is to make sure these codes are set to complete. If all of them are not set to complete, the vehicle may fail the test, or the test cannot be finished.

To check if the readiness codes are set to complete, turn the ignition switch ON (II), but do not start the engine. The MIL will come on for 15-20 seconds. If it then goes off, the readiness codes are complete. If it flashes five

times, one or more readiness codes are not complete. To set each code, drive the vehicle or run the engine as described in the procedures in this section (see **HOW TO SET READINESS CODES**).

MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR

The MAP sensor converts manifold absolute pressure into electrical signals to the ECM/PCM.

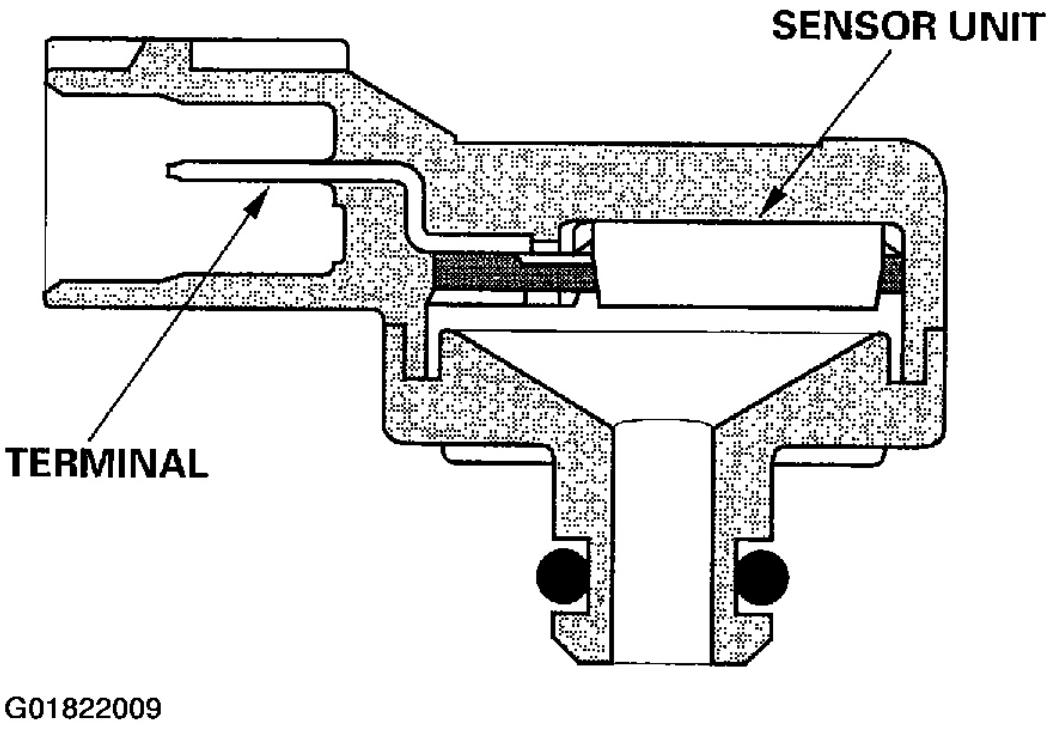

Fig. 41: Cutaway View Of Manifold Absolute Pressure (MAP) Sensor

SECONDARY HEATED OXYGEN SENSOR (SECONDARY HO2S)

The secondary HO2S detects the oxygen content in the exhaust gas downstream of the three way catalytic converter (TWC), and sends signals to the ECM/PCM which varies the duration of fuel injection accordingly. To stabilize its output, the sensor has an internal heater. The ECM/PCM compares the HO2S output with the A/F sensor output to determine catalyst efficiency. The secondary HO2S is located on the TWC.

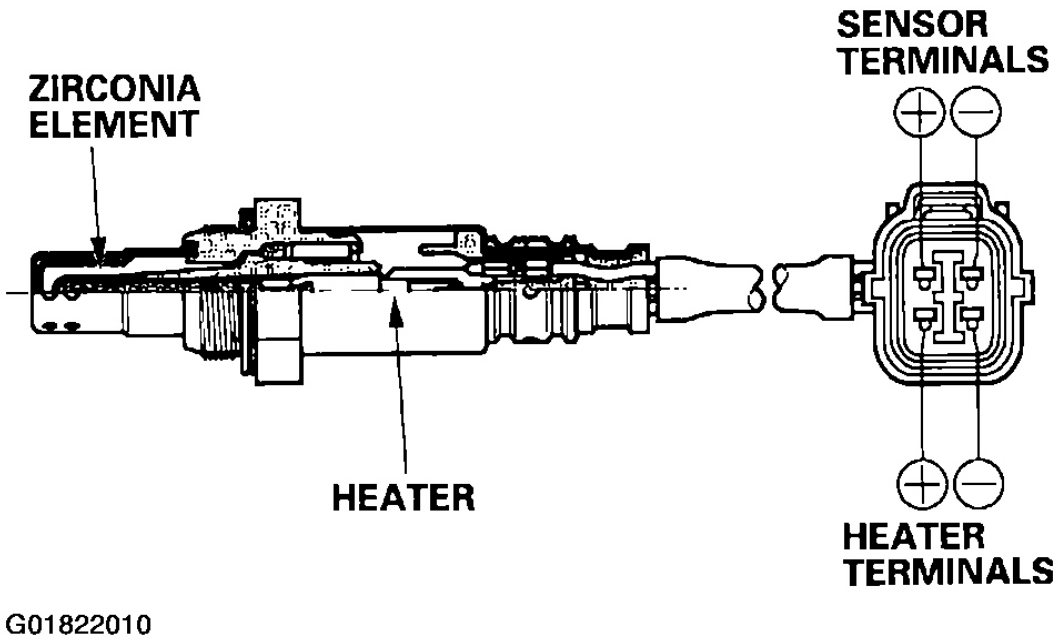

Fig. 42: Cutaway View Of Secondary Heated Oxygen Sensor (Secondary HO2S)

ELECTRONIC THROTTLE CONTROL SYSTEM

The throttle is electronically controlled by the electronic throttle control system. Refer to the System Diagram to see the functional layout of the system.

Idle Control: When the engine is idling, the ECM/PCM controls the throttle actuator to maintain the proper idle speed according to engine loads.

Acceleration Control: When the accelerator pedal is pressed, the ECM/PCM opens the throttle valve depending on the accelerator pedal position (APP) sensor signal.

Cruise Control: The ECM/PCM controls the throttle actuator to maintain set speed when the cruise control is operating. The throttle actuator takes the place of the cruise control actuator.

ACCELERATOR PEDAL POSITION (APP) SENSOR

As the accelerator pedal position changes, the sensor varies the signal voltage to the ECM/PCM.

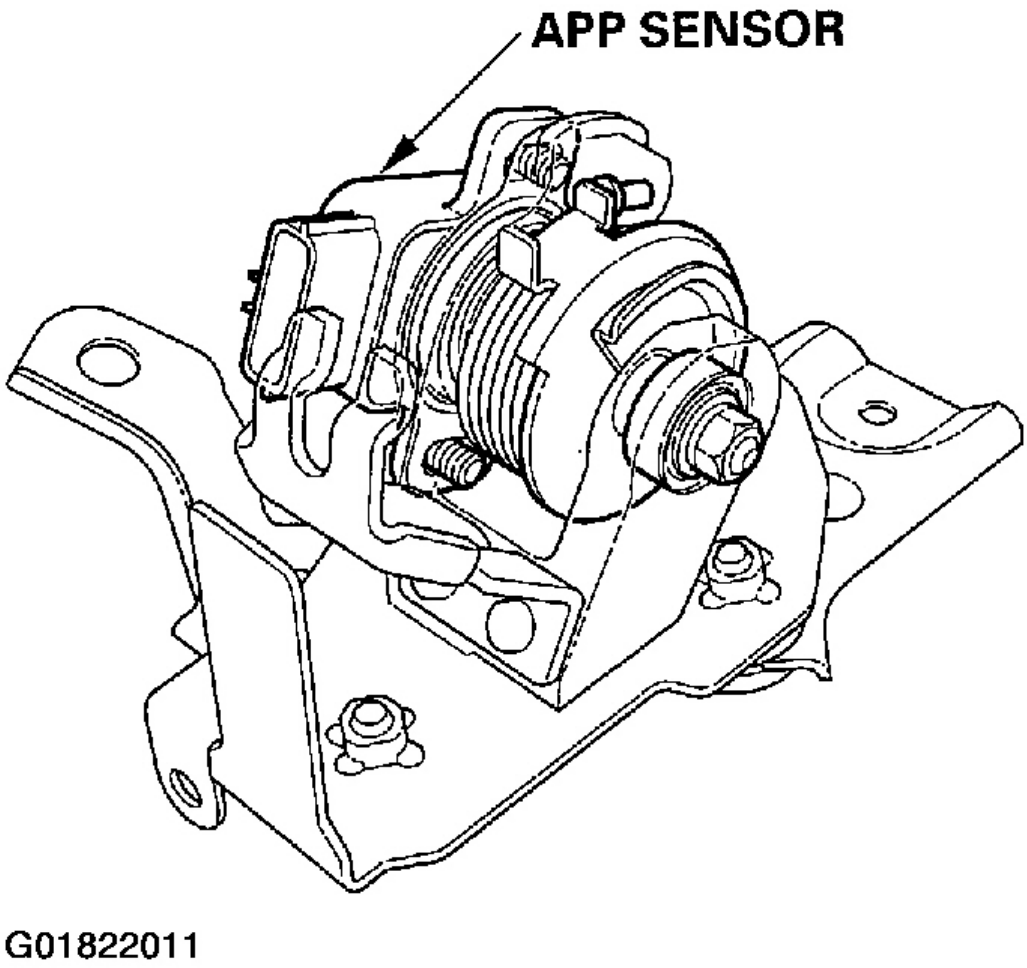

Fig. 43: Locating Accelerator Pedal Position (APP) Sensor

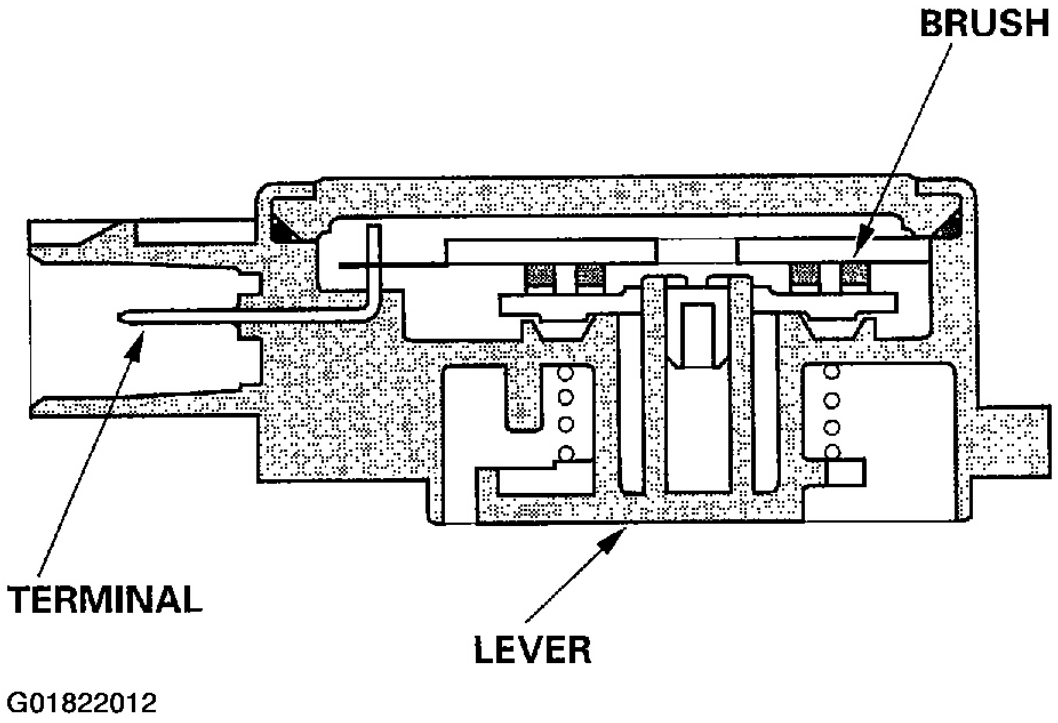

Fig. 44: Cutaway View Of Accelerator Pedal Position (APP) Sensor

THROTTLE BODY

The throttle body is a single-barrel side draft type. The lower portion of the throttle valve is heated by engine coolant from the cylinder head to prevent icing of the throttle plate.

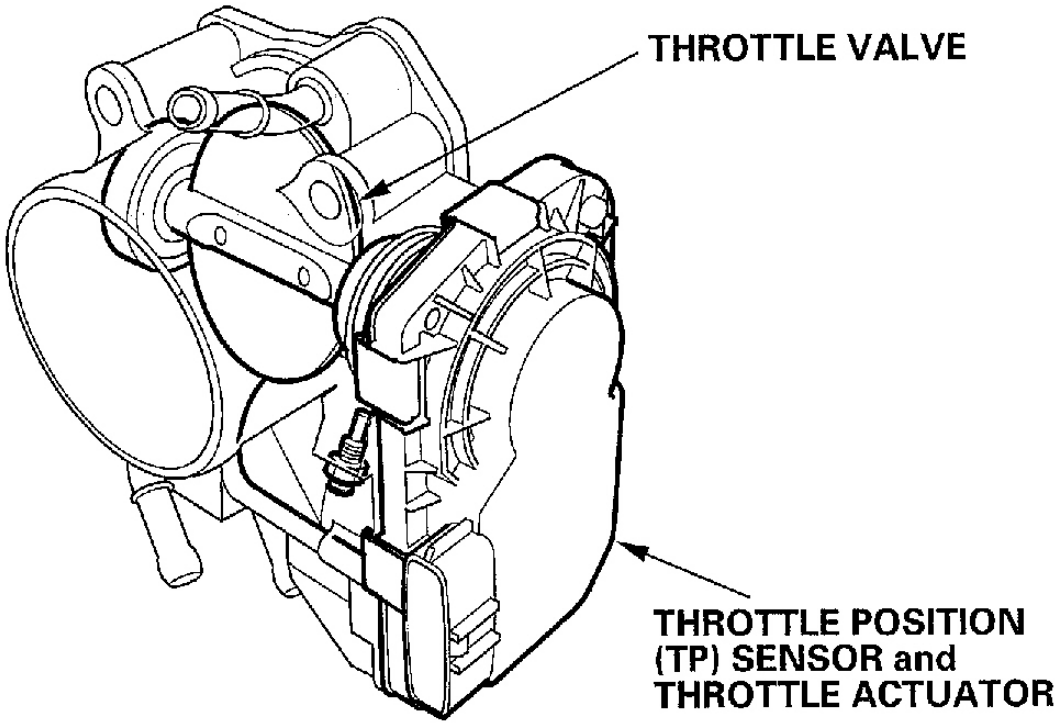

Fig. 45: Identifying Throttle Body Components

VTEC/VTC

The i-VTEC has a VTC (Variable Valve Timing Control) mechanism on the intake camshaft in addition to the usual VTEC. This mechanism improves fuel efficiency and reduces exhaust emissions at all levels of engine speed, vehicle speed, and engine load.

The VTEC mechanism changes the valve lift and timing by using more than one cam profile.

The VTC changes the phase of the intake camshaft via oil pressure. It changes the intake valve timing continuously.

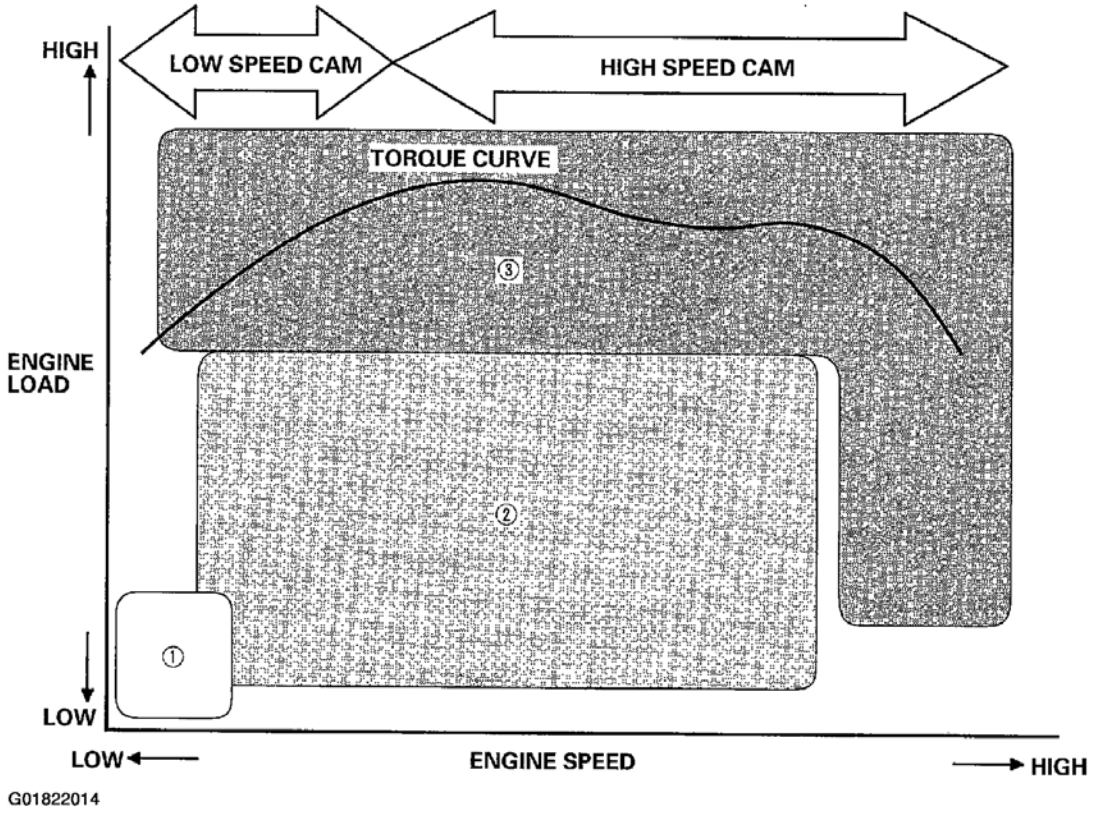

Fig. 46: VTEC/VTC Operation Chart

Driving Condition	VTC Control	Description
① Light-load	Base Position	For stable combustion the cam angle is retarded, and reduces the entry of exhaust gas into the cylinder.
② Medium/high-load	Advance Control	Cam phase angle is controlled to optimize valve timing, improving fuel efficiency and reducing emmission.
③ High speed	Advance-Base Position	To reduce the pumping loss, the intake valve is closed quickly. This helps the entry of fuel air mixture by the charging effect, and maximizes engine power.

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Fig. 47: VTEC/VTC Description

VTC system

The VTC system makes continuous intake valve timing changes based on operating conditions. Intake valve timing is optimized to allow the engine to produce maximum power.

Cam angle is advanced to obtain the EGR effect and reduce pumping loss. The intake valve is closed quickly to reduce the entry of the air/fuel mixture into the intake port and improve the charging effect.

The system reduces the cam advance at idle, stabilizes combustion, and reduces engine speed.

If a malfunction occurs, the VTC system control is disabled and the valve timing is fixed at the fully retarded position.

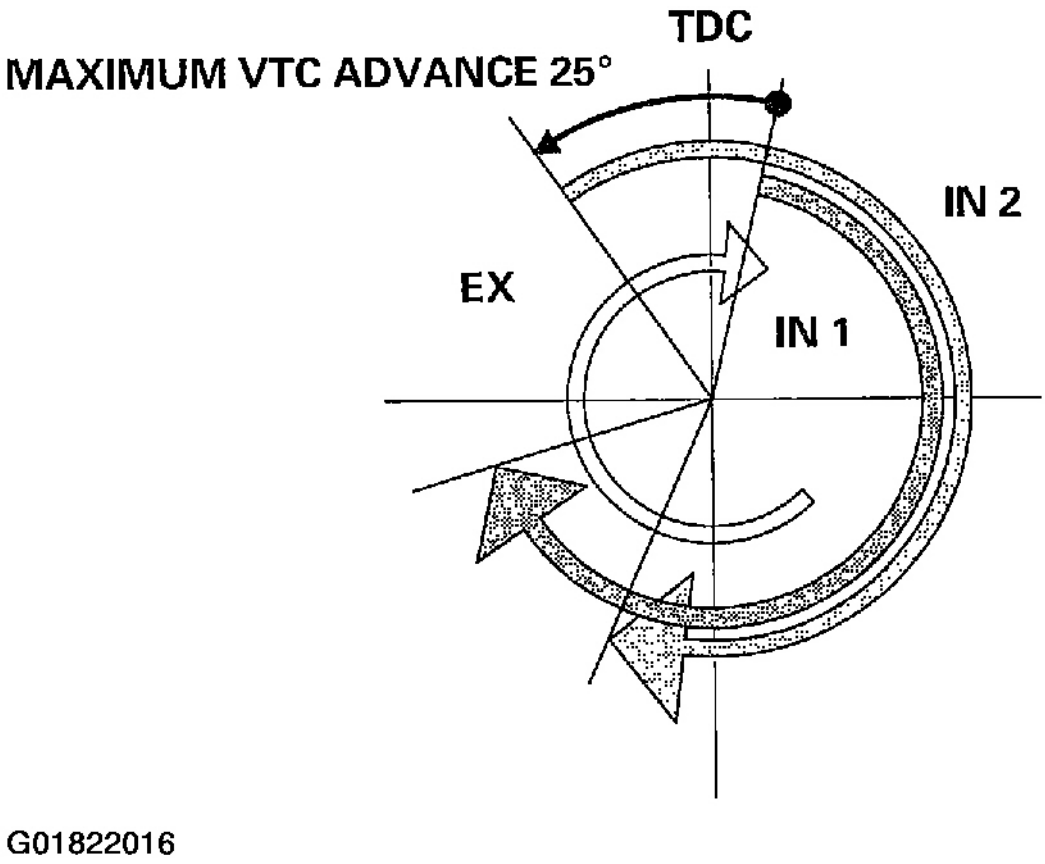

Fig. 48: VTC System Intake Valve Timing Chart

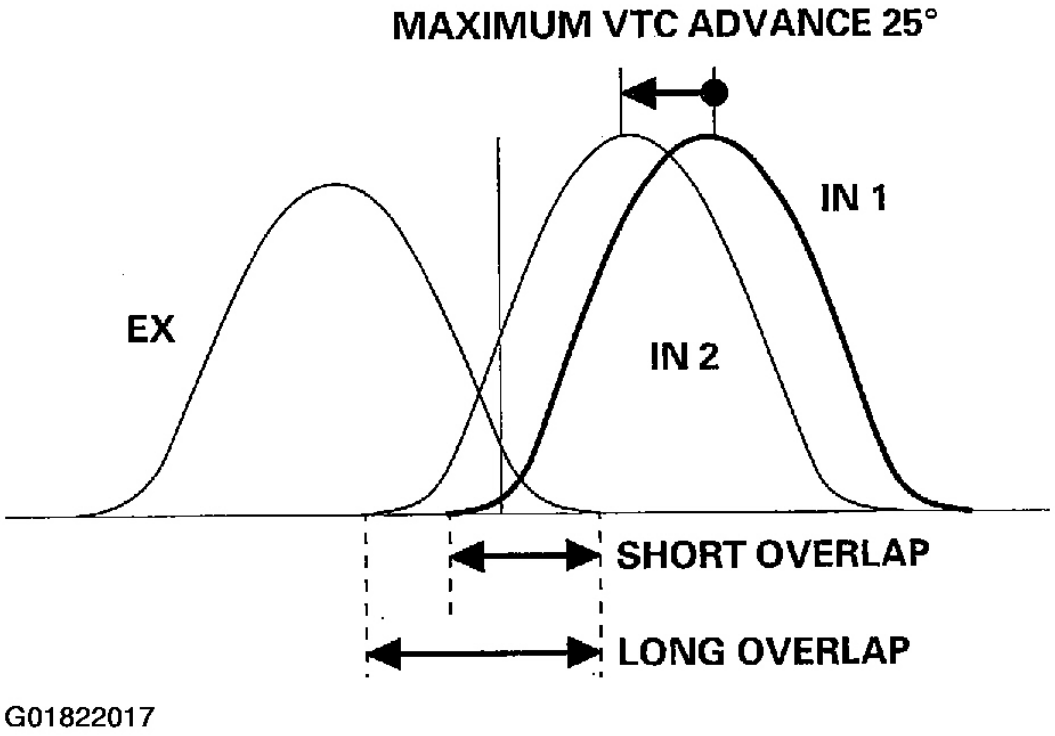

Fig. 49: VTC System Intake Valve Timing

VTEC system

The VTEC system changes the cam profile to correspond to the engine speed. It maximizes torque at low engine speed and output at high engine speed.

The low lift cam is used at low engine speeds, and the high lift cam is used at high engine speeds.

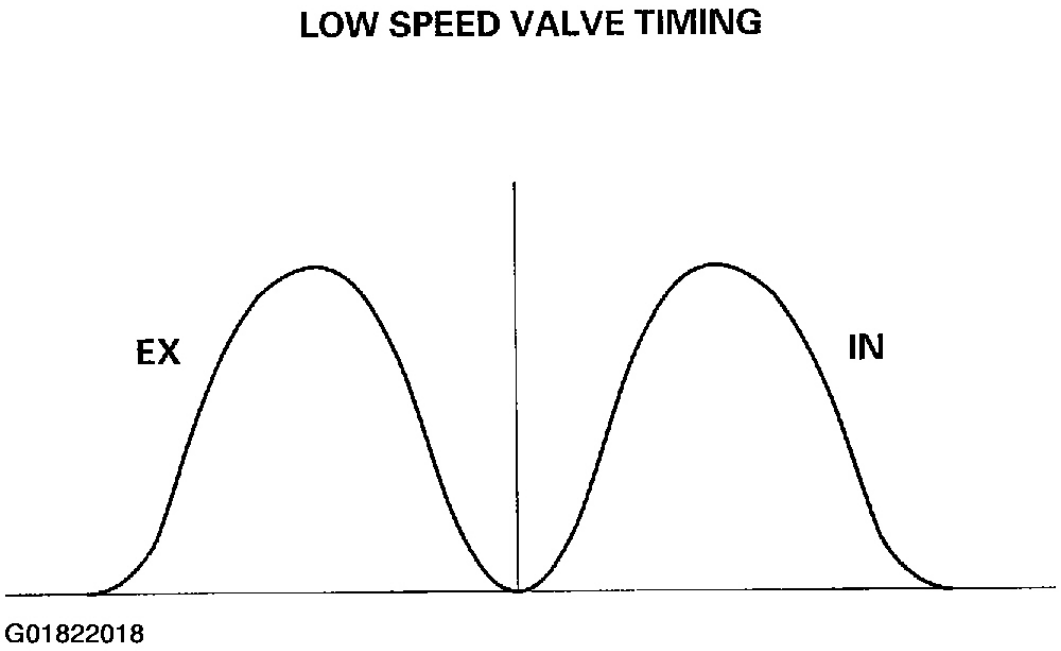

Fig. 50: Low Speed Valve Timing

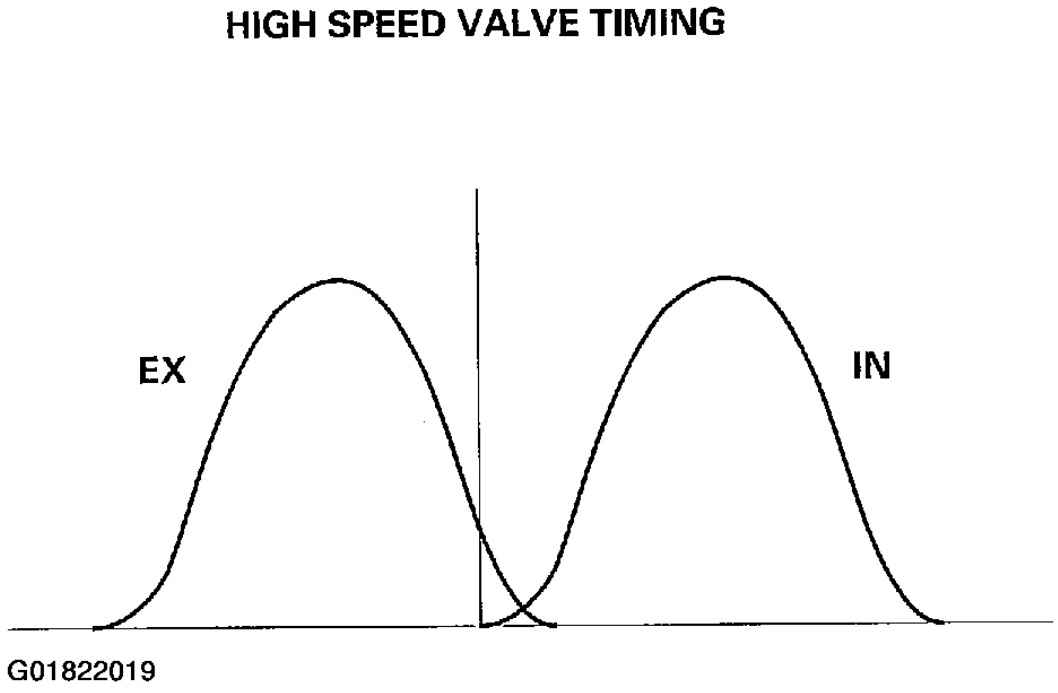

Fig. 51: High Speed Valve Timing

VTEC/VTC

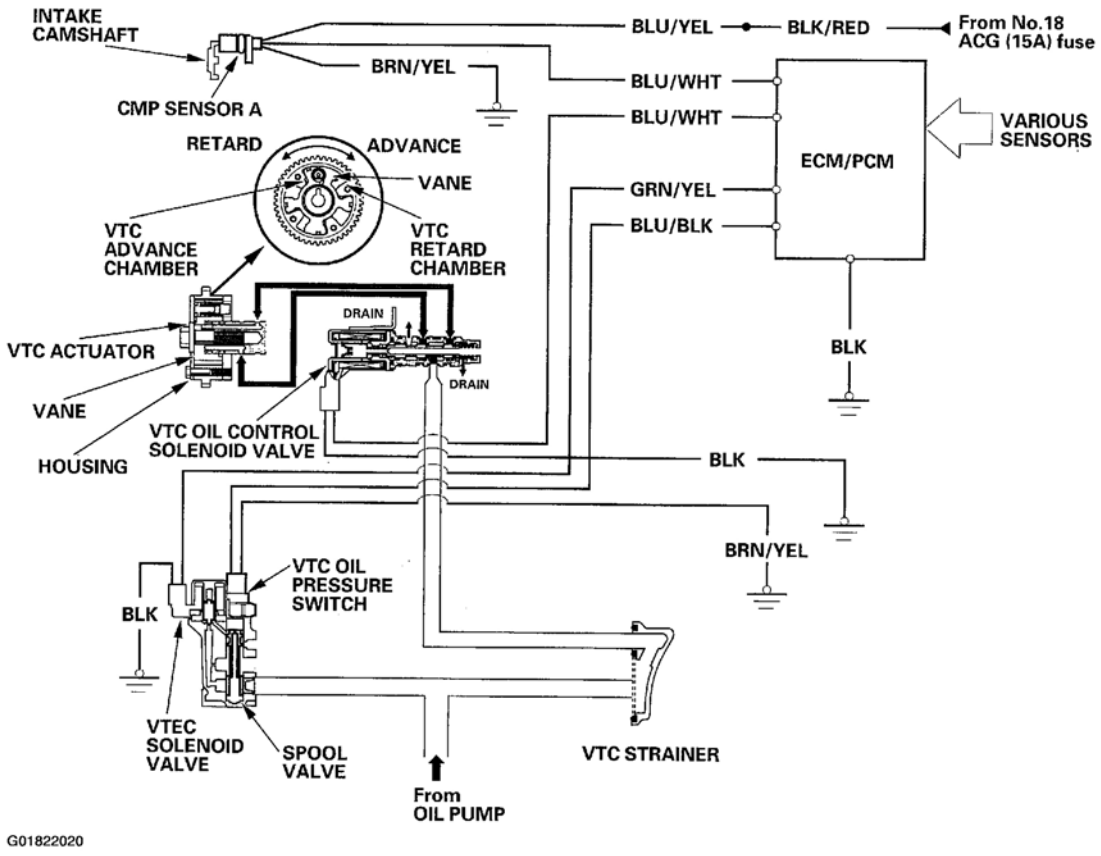

Fig. 52: VTEC/VTC System Wiring Diagram

CAMSHAFT POSITION (CMP) SENSOR A

This sensor detects camshaft angle position for the VTC system.

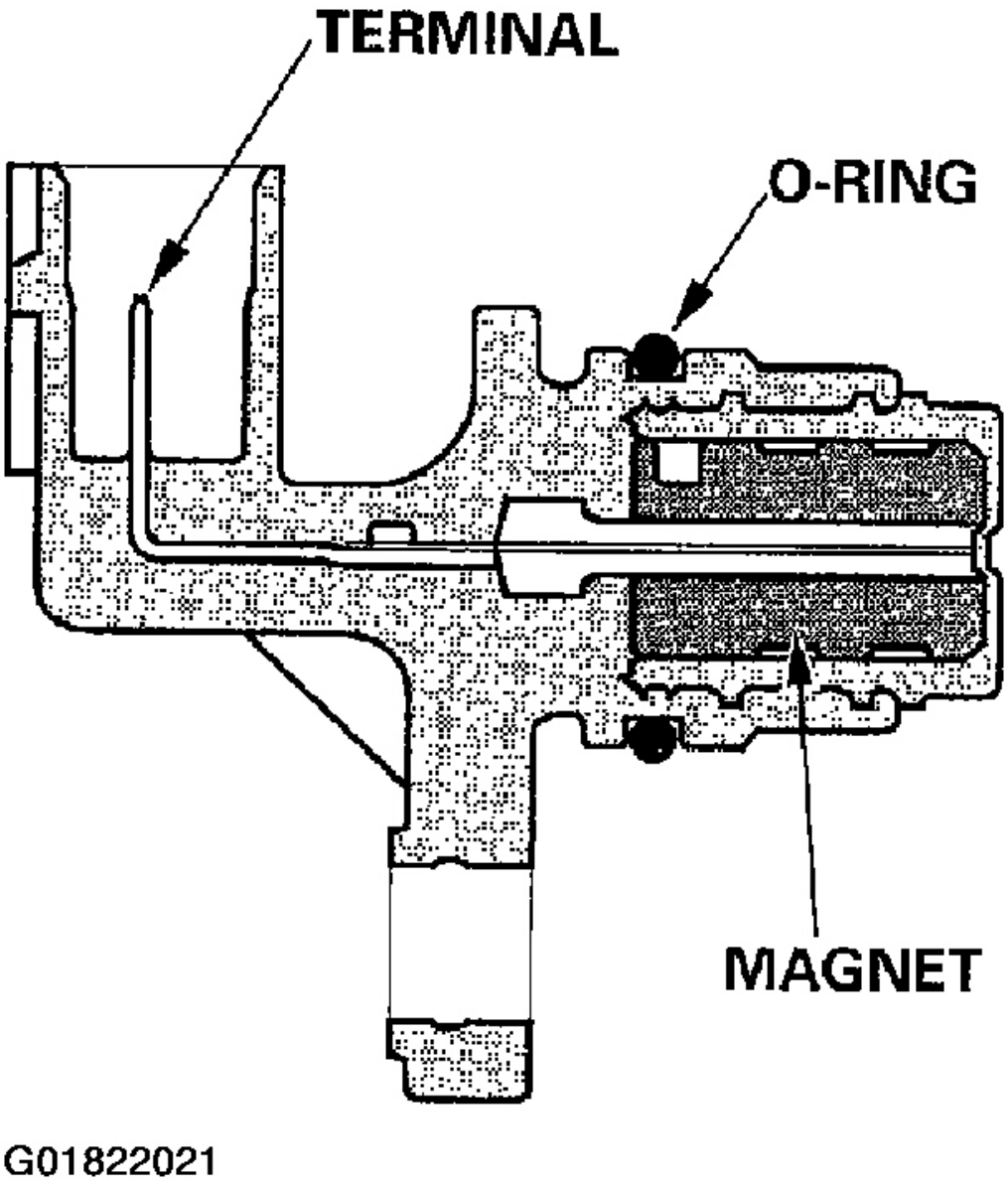

Fig. 53: Cutaway View Of Camshaft Position (CMP) Sensor A

IDLE CONTROL SYSTEM

When the engine is cold, the A/C compressor is on, the transmission is in gear, the brake pedal is pressed, the power steering load is high, or the alternator is charging, the ECM/PCM controls current to the throttle actuator to maintain the correct idle speed.

BRAKE PEDAL POSITION SWITCH

The brake pedal position switch signals the ECM/PCM when the brake pedal is pressed.

POWER STEERING PRESSURE (PSP) SWITCH

The PSP switch signals the ECM/PCM when the power steering load is high.

FUEL SUPPLY SYSTEM

Fuel Cut-off Control

During deceleration with the throttle valve closed, current to the injectors is cut off to improve fuel economy at engine speeds over 1,000 RPM. Fuel cut-off control also occurs when the engine speed exceeds 7,300 RPM, regardless of the position of the throttle valve, to protect the engine from over-revving. When the vehicle is stopped, the ECM/PCM cuts the fuel at engine speeds over 5,000 RPM (M/T: 4,500 RPM). Engine speed of fuel cut is lower on a cold engine.

Fuel Pump Control

When the ignition is turned on, the ECM/PCM grounds the PGM-FI main relay which feeds current to the fuel pump for 2 seconds to pressurize the fuel system. With the engine running, the ECM/PCM grounds the PGM-FI main relay and feeds current to the fuel pump. When the engine is not running and the ignition is on, the ECM/PCM cuts ground to the PGM-FI main relay which cuts current to the fuel pump.

PGM-FI MAIN RELAY 1 & 2

The PGM-FI relay consists of two separate relays. PGM-FI main relay 1 (FI MAIN) is energized whenever the ignition switch is ON (II) to supply battery voltage to the ECM/PCM, power to the injectors, and power for PGM-FI main relay 2 (FUEL PUMP). PGM-FI main relay 2 is energized to supply power to the fuel pump for 2 seconds when the ignition switch is turned ON (II), and when the engine is cranking or running.

INTAKE AIR SYSTEM

This system supplies air for engine needs.

Intake Air Bypass Control Thermal Valve

When the engine is cold, the intake air bypass control thermal valve sends air to the injector. The amount of air is regulated by engine coolant temperature. Once the engine is hot, the intake air bypass control thermal valve closes, stopping air to the injector.

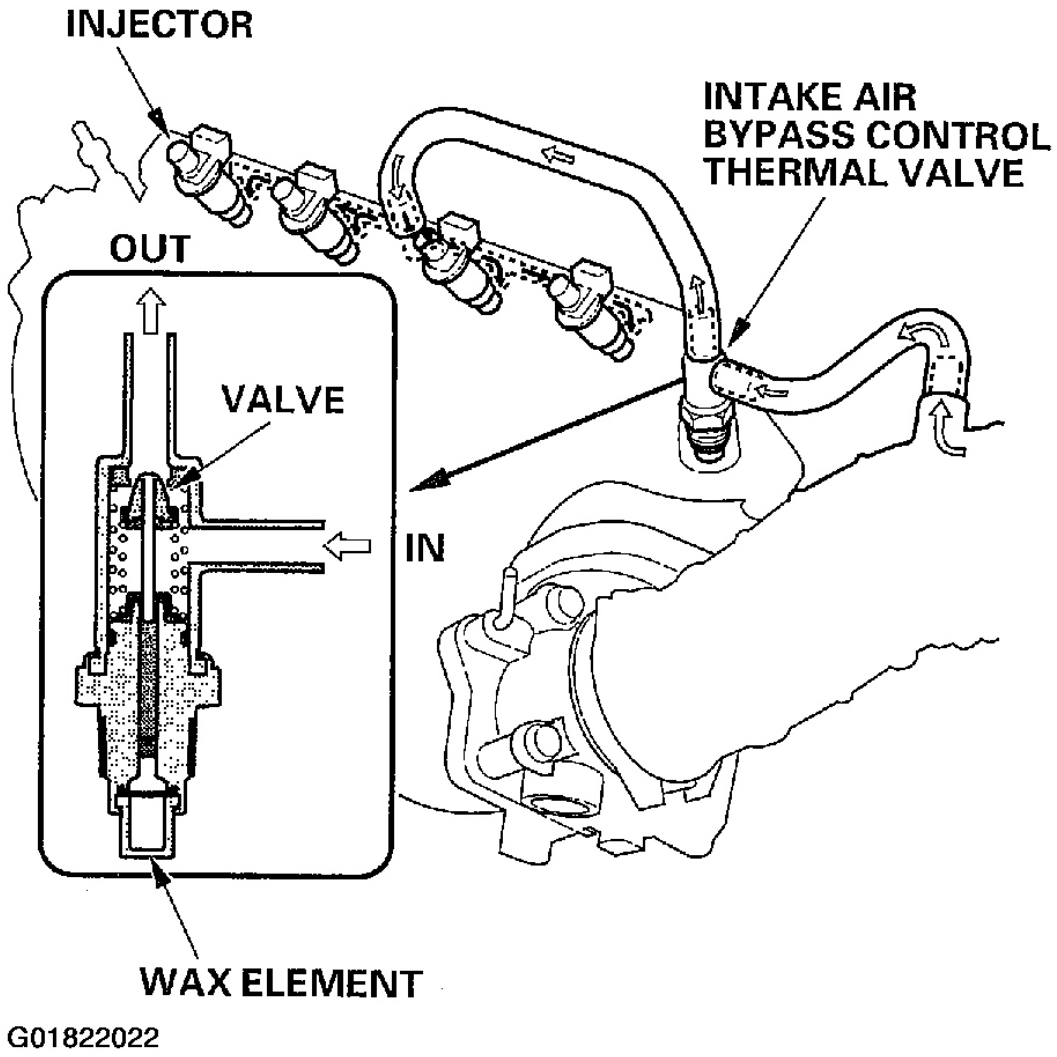

Fig. 54: Locating Intake Air Bypass Control Thermal Valve

Resonator

A resonator in the intake air duct provides additional silencing as air is drawn into the engine.

CATALYTIC CONVERTER SYSTEM

Three Way Catalytic Converter (TWC)

The TWC converts hydrocarbons (HC), carbon monoxide (CO), and oxides of nitrogen (NOx) in the exhaust gas to carbon dioxide (CO2), nitrogen (N2), and water vapor.

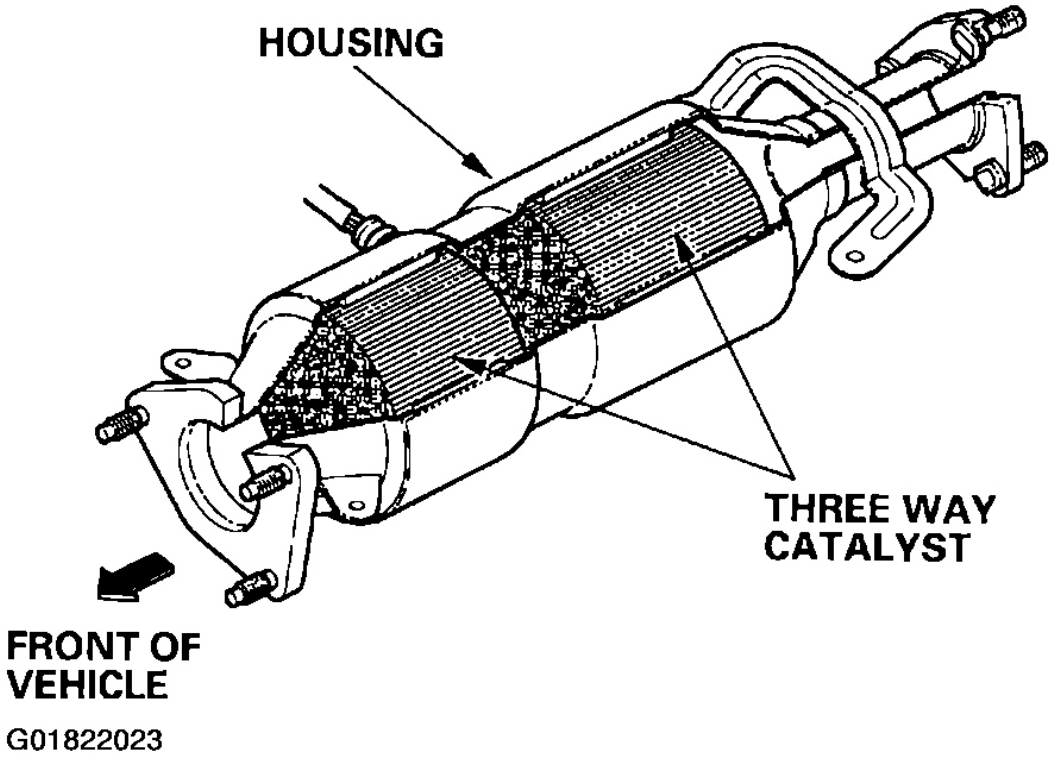

Fig. 55: Cutaway View Of Three Way Catalytic Converter (TWC)

POSITIVE CRANKCASE VENTILATION (PCV) SYSTEM

The PCV valve prevents blow-by gasses from escaping into the atmosphere by venting them into the intake manifold.

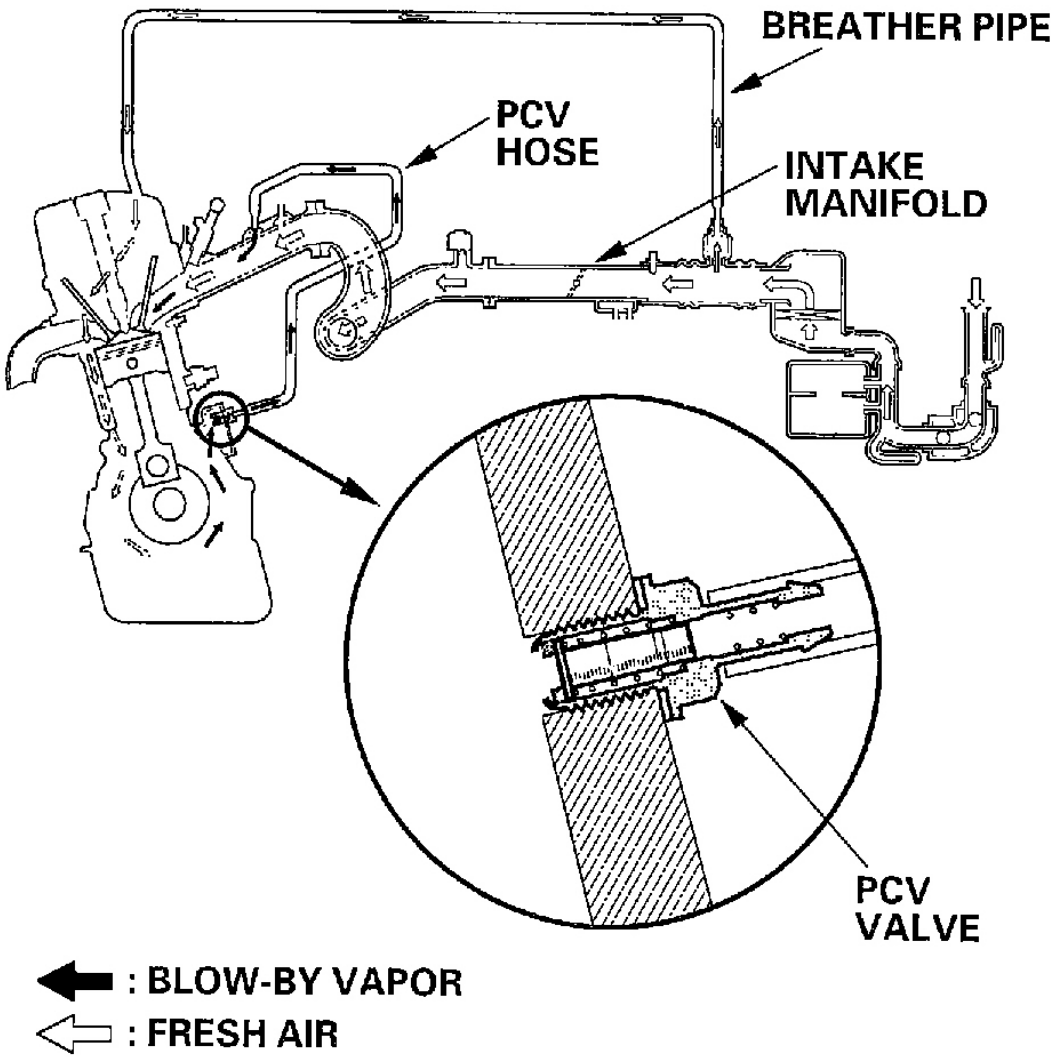

Fig. 56: Identifying Positive Crankcase Ventilation (PCV) System

EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM

Refer to the System Diagram to see the functional layout of the system.

EVAP Canister

The EVAP canister temporarily stores fuel vapor from the fuel tank until it can be purged from the EVAP canister into the engine and burned.

EVAP Canister Purge Valve

When the engine coolant temperature is below 131°F (55°C), the ECM/PCM turns off the EVAP canister purge valve which cuts vacuum to the EVAP canister.

Fuel Tank Pressure (FTP) Sensor

The FTP sensor converts fuel tank absolute pressure into an electrical input to the ECM/PCM during the EVAP leak check.

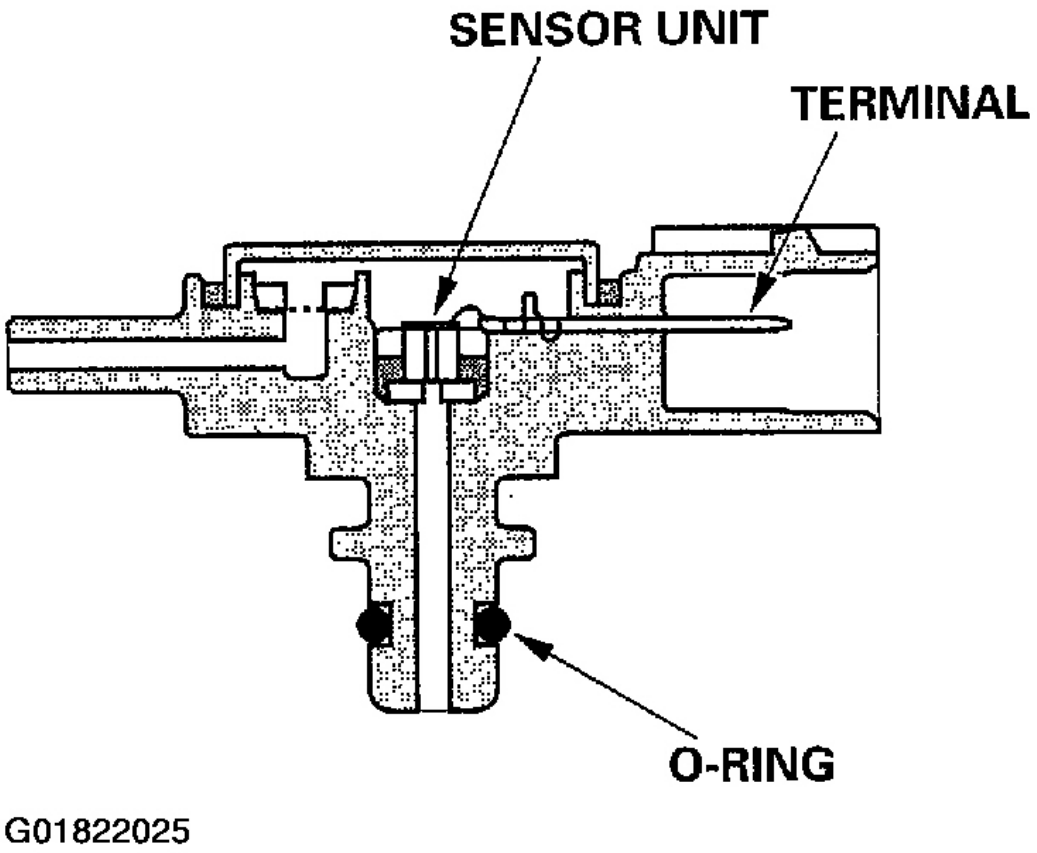

Fig. 57: Cutaway View Of Fuel Tank Pressure (FTP) Sensor

EVAP Canister Vent Shut Valve

The EVAP canister vent shut valve is on the EVAP canister. The EVAP canister vent shut valve controls the venting of the EVAP canister.

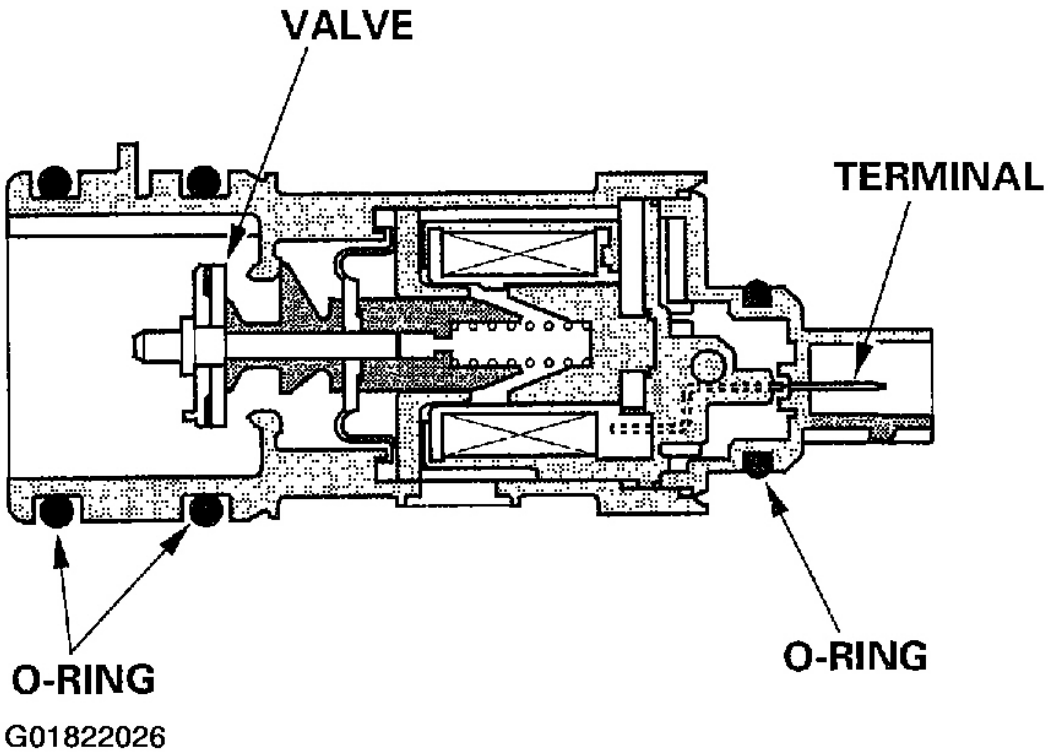

Fig. 58: Cutaway View Of EVAP Canister Vent Shut Valve

ELECTRONIC THROTTLE CONTROL SYSTEM DIAGRAM

The electronic throttle control system consists of the throttle actuator, throttle position (TP) sensor, accelerator pedal position (APP) sensor, throttle actuator control module, and the ECM/PCM. The throttle is electronically controlled by this system.

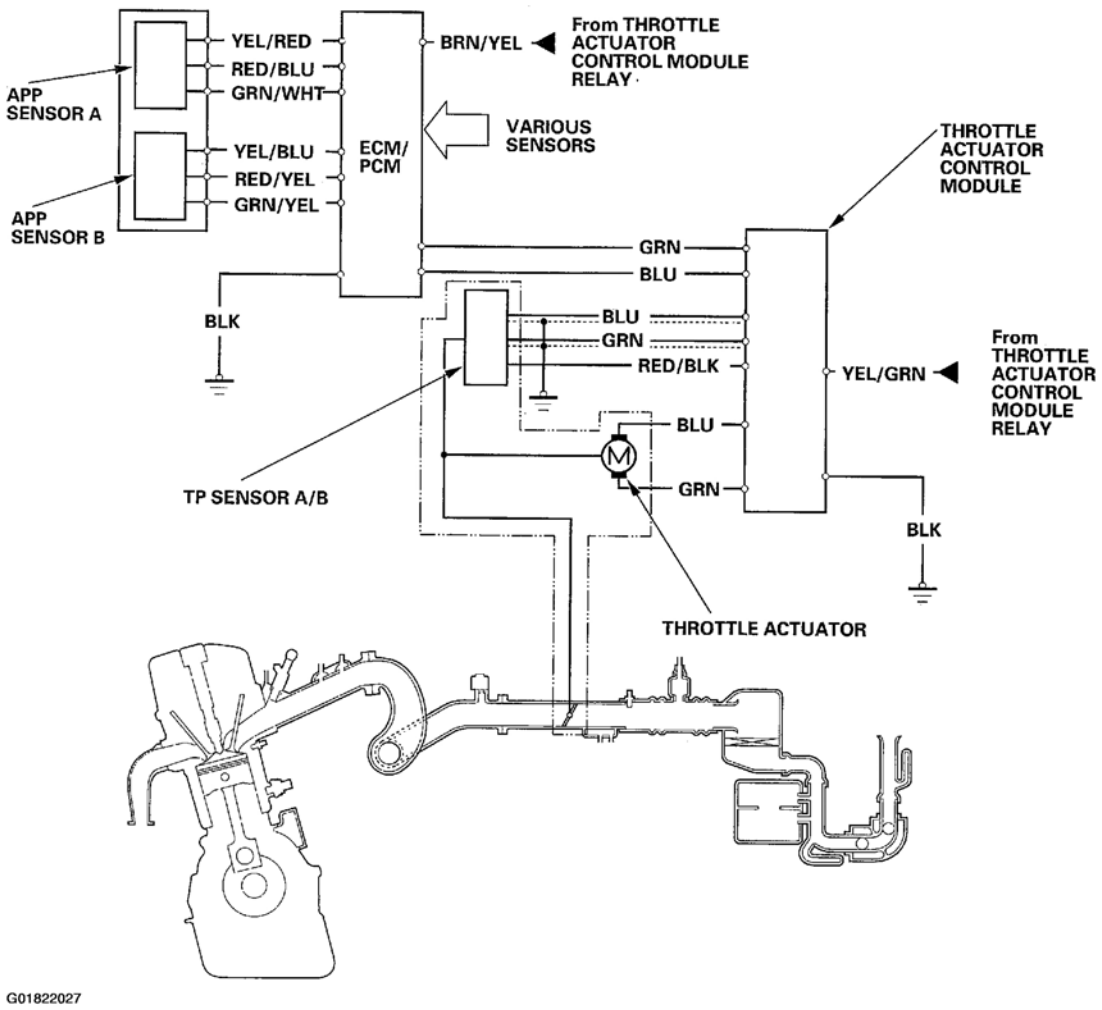

Fig. 59: Electronic Throttle Control System Diagram

EVAPORATIVE EMISSION (EVAP) CONTROL DIAGRAM

The EVAP controls minimize the amount of fuel vapor escaping to the atmosphere. Vapor from the fuel tank is temporarily stored in the EVAP canister unit it can be purged from the canister into the engine and burned.

The EVAP canister is purged by drawing fresh air through it and into a port on the intake manifold. The purging vacuum is controlled by the EVAP canister purge valve, which operates whenever engine coolant temperature is above 131°F (55°C).

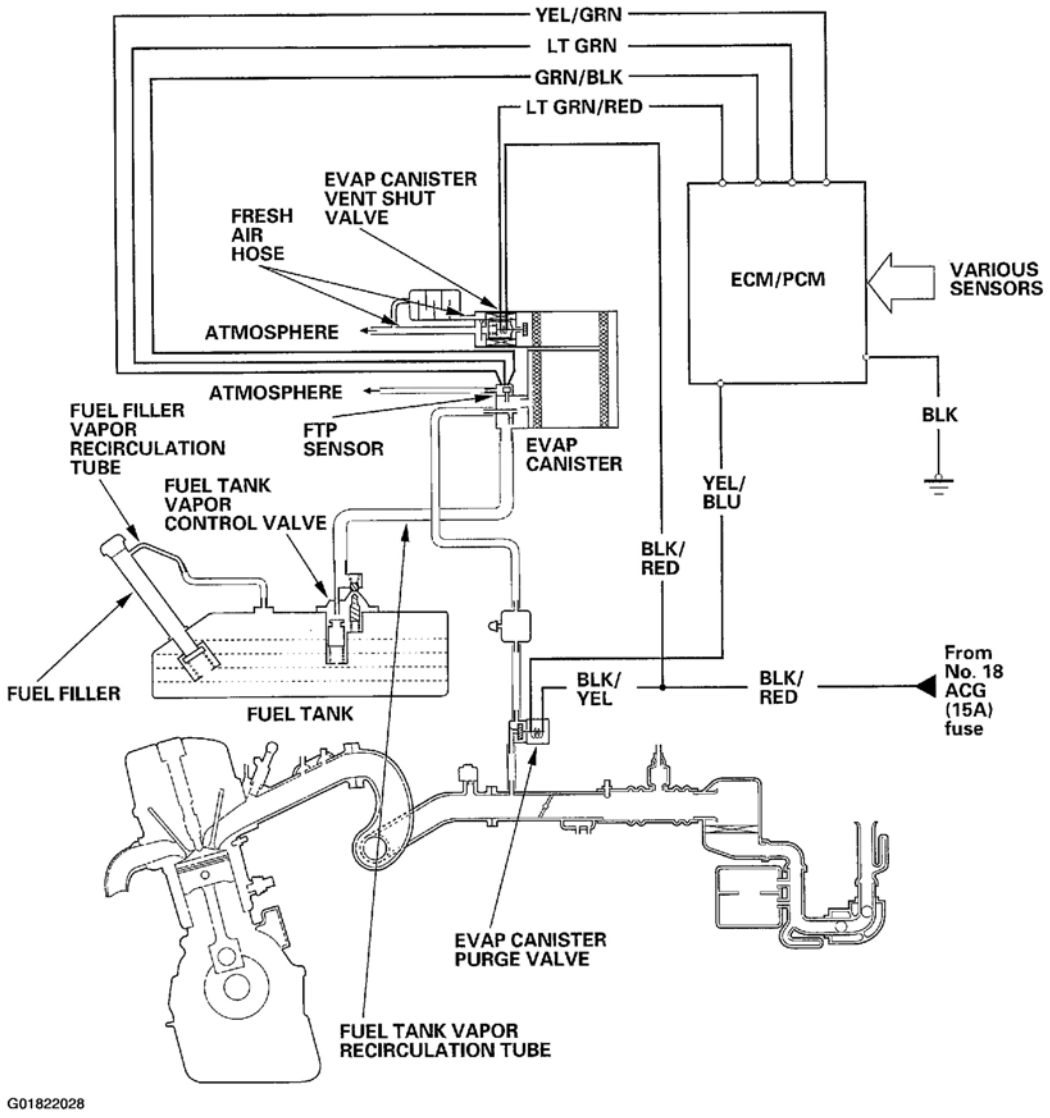

Fig. 60: Evaporative Emission (EVAP) System Schematic

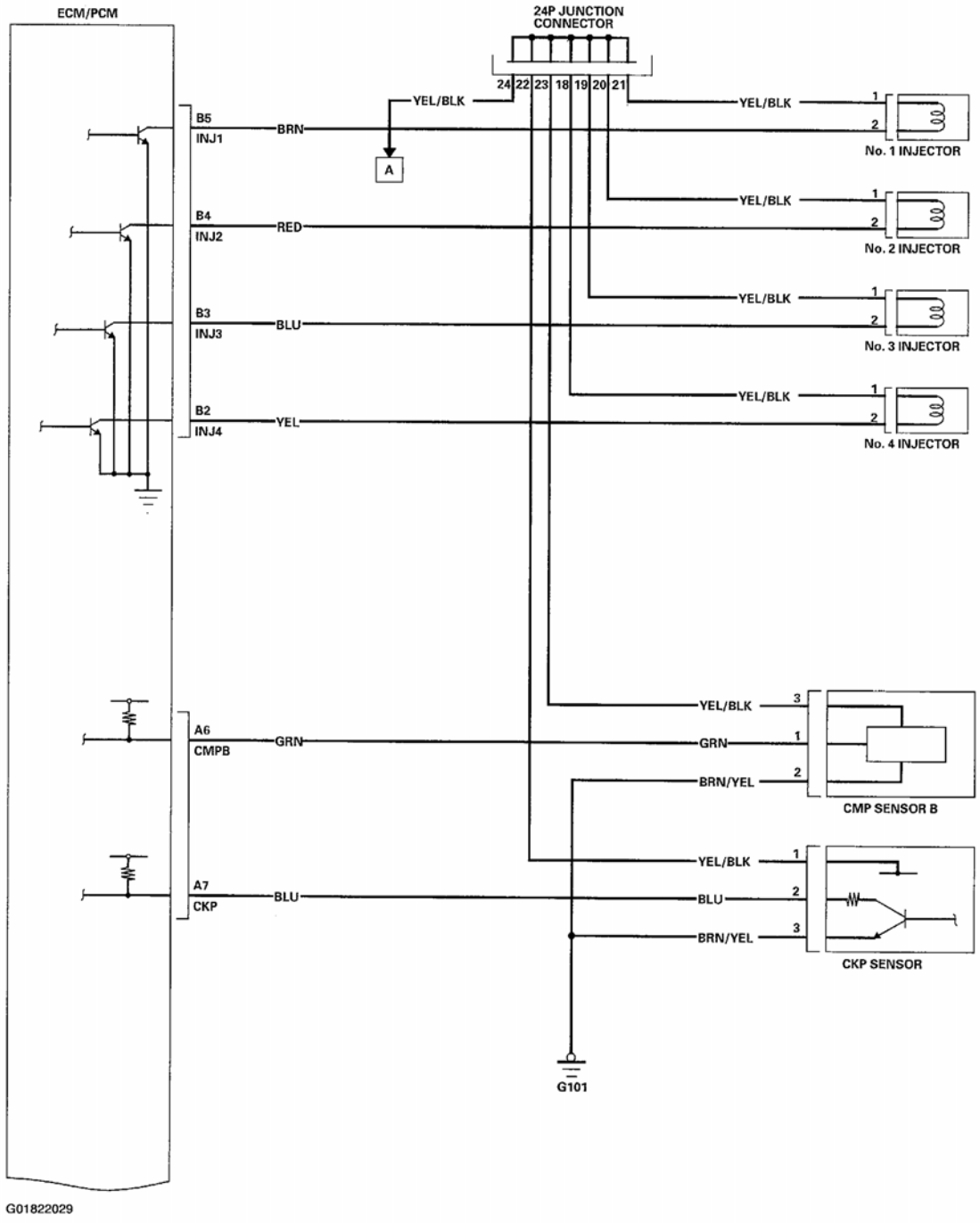

Fig. 61: Evaporative Emission (EVAP) System Wiring Diagram (1 Of 11)

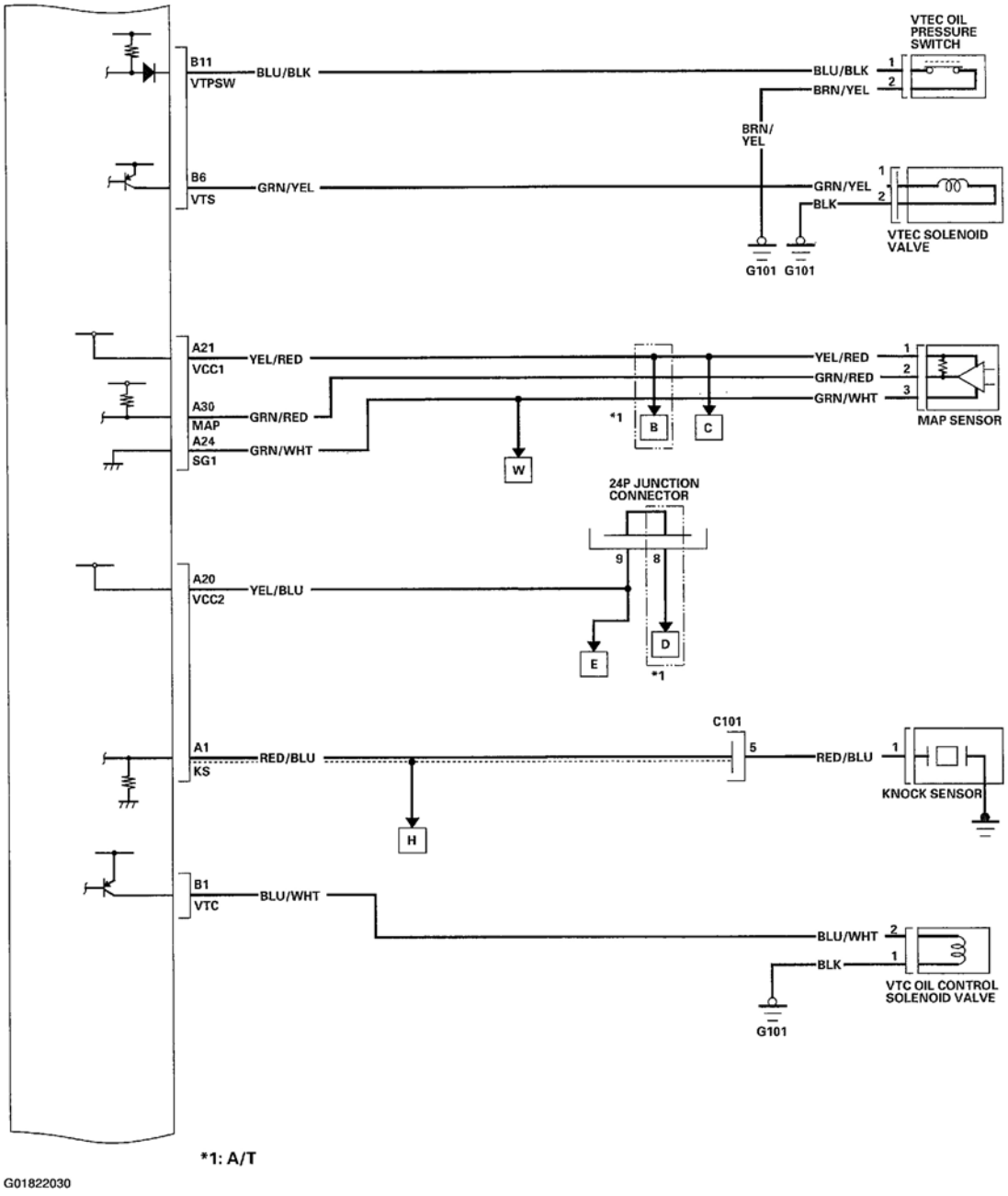

Fig. 62: Evaporative Emission (EVAP) System Wiring Diagram (2 Of 11)

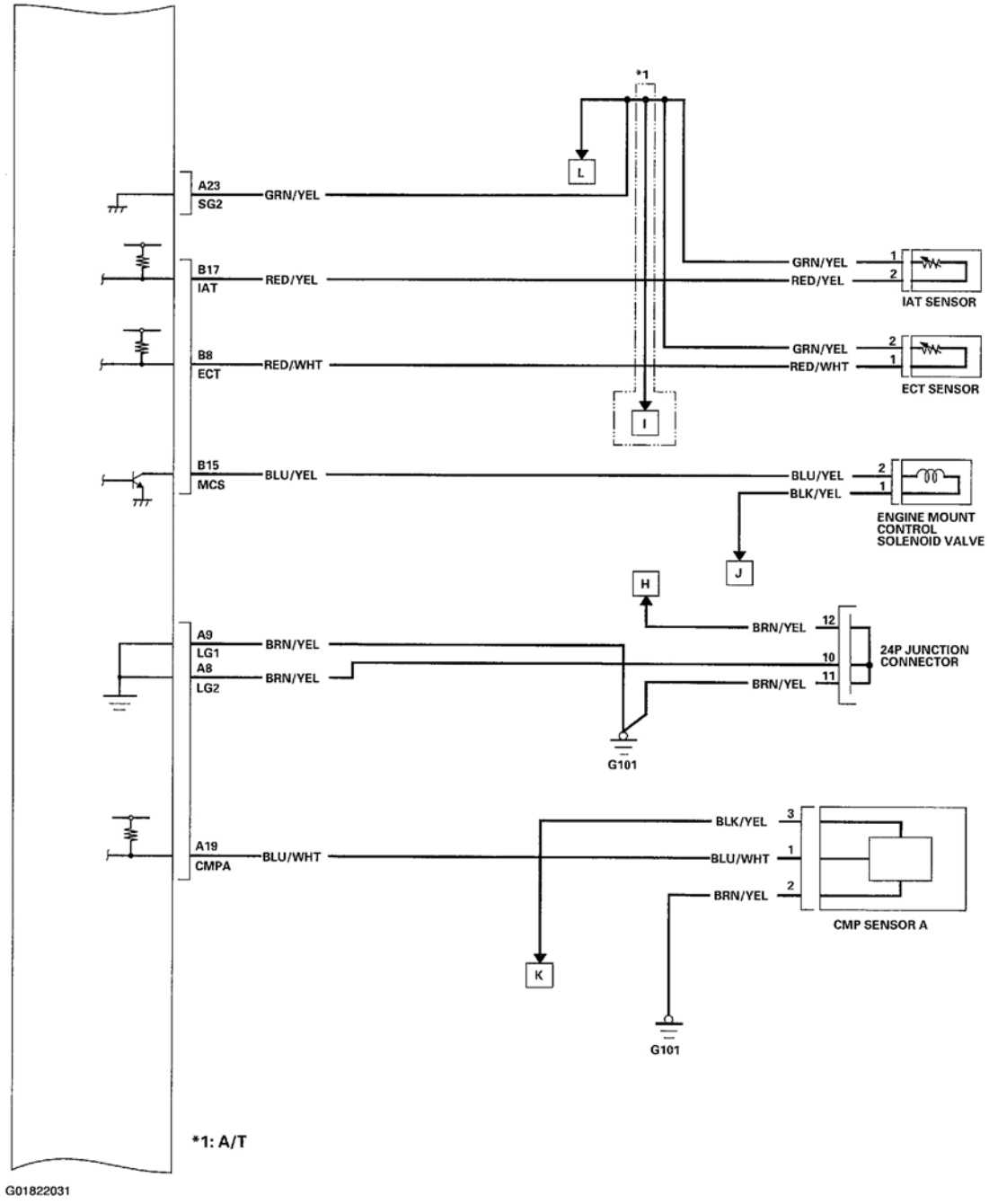

Fig. 63: Evaporative Emission (EVAP) System Wiring Diagram (3 Of 11)

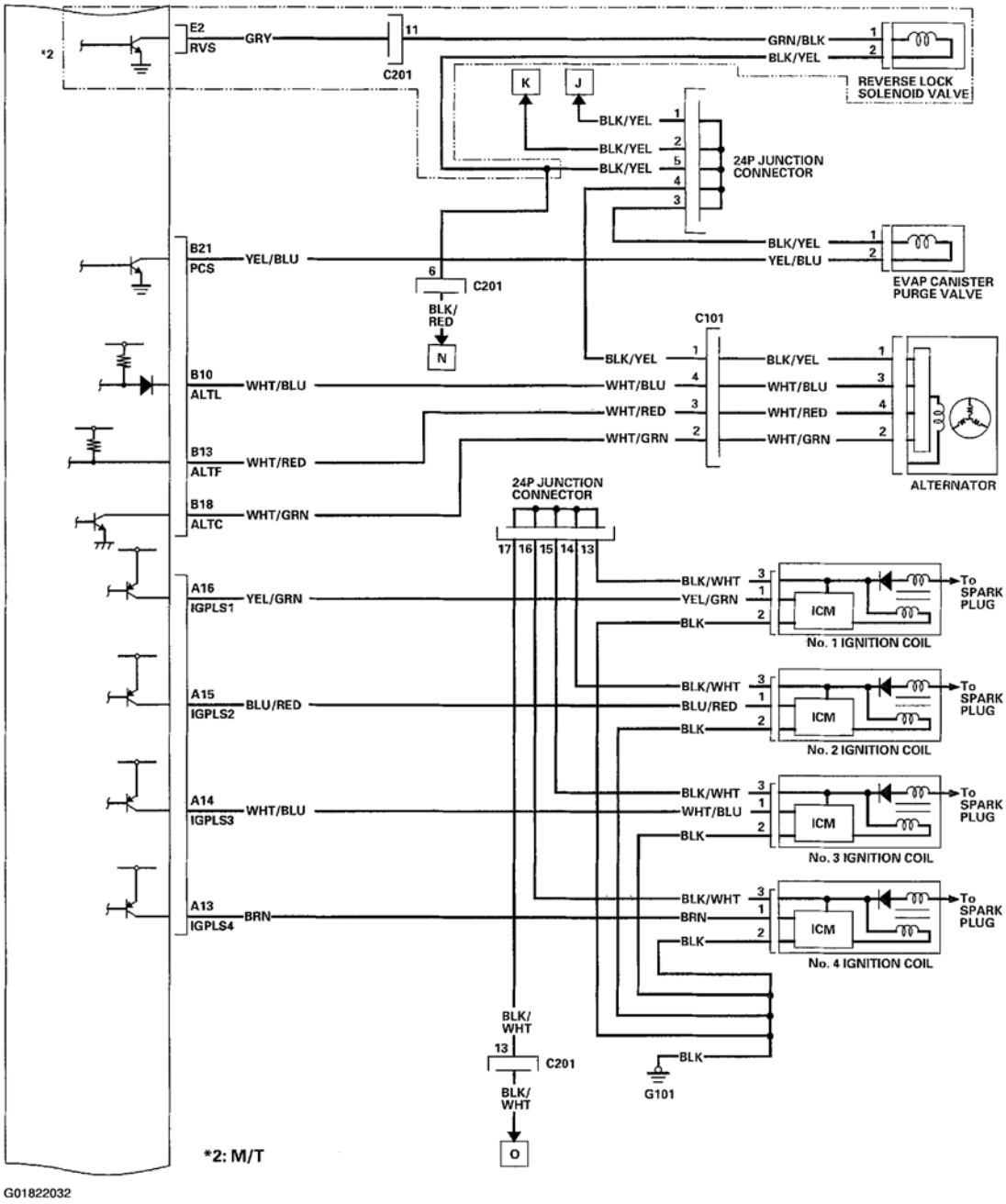

Fig. 64: Evaporative Emission (EVAP) System Wiring Diagram (4 Of 11)

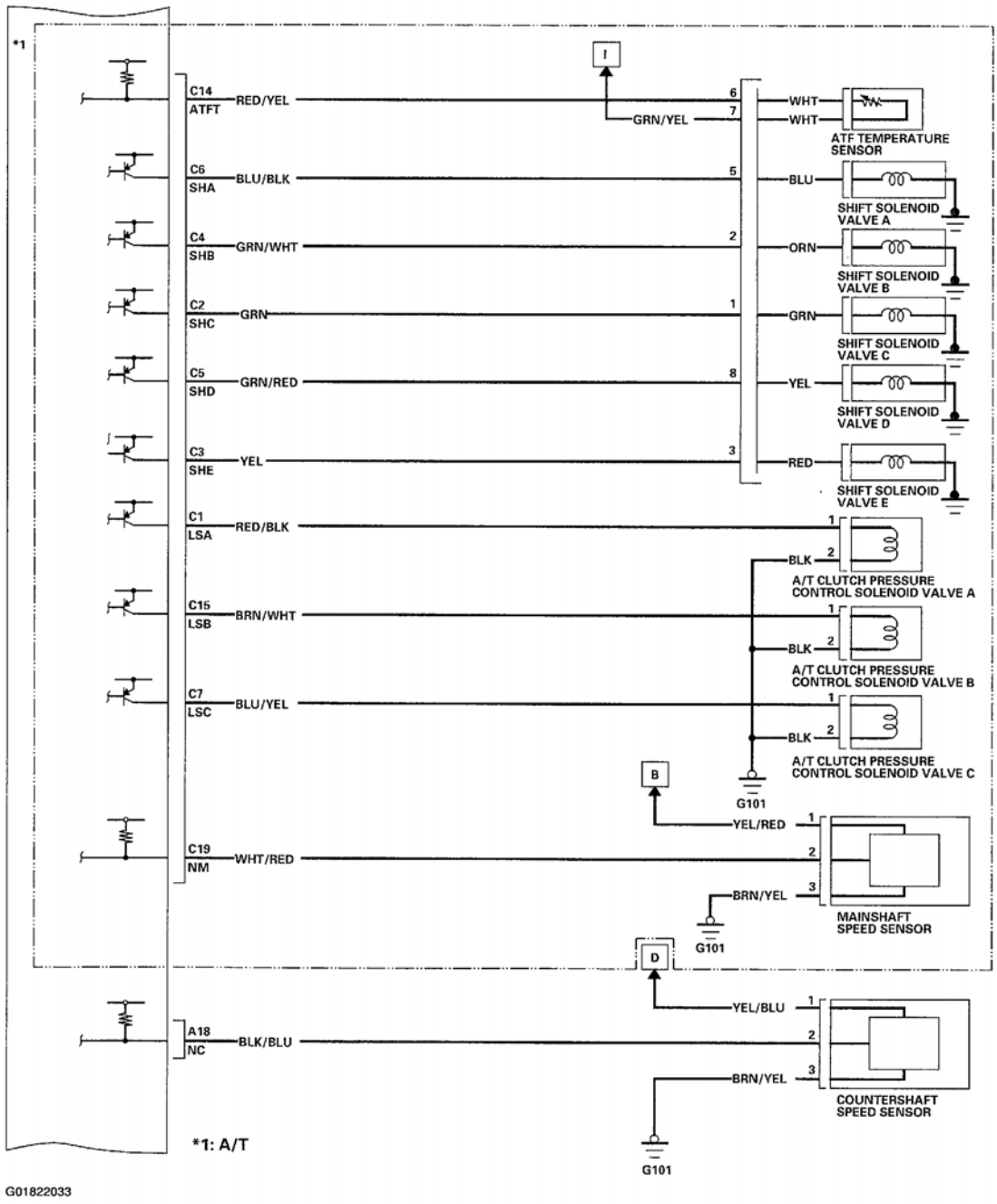

Fig. 65: Evaporative Emission (EVAP) System Wiring Diagram (5 Of 11)

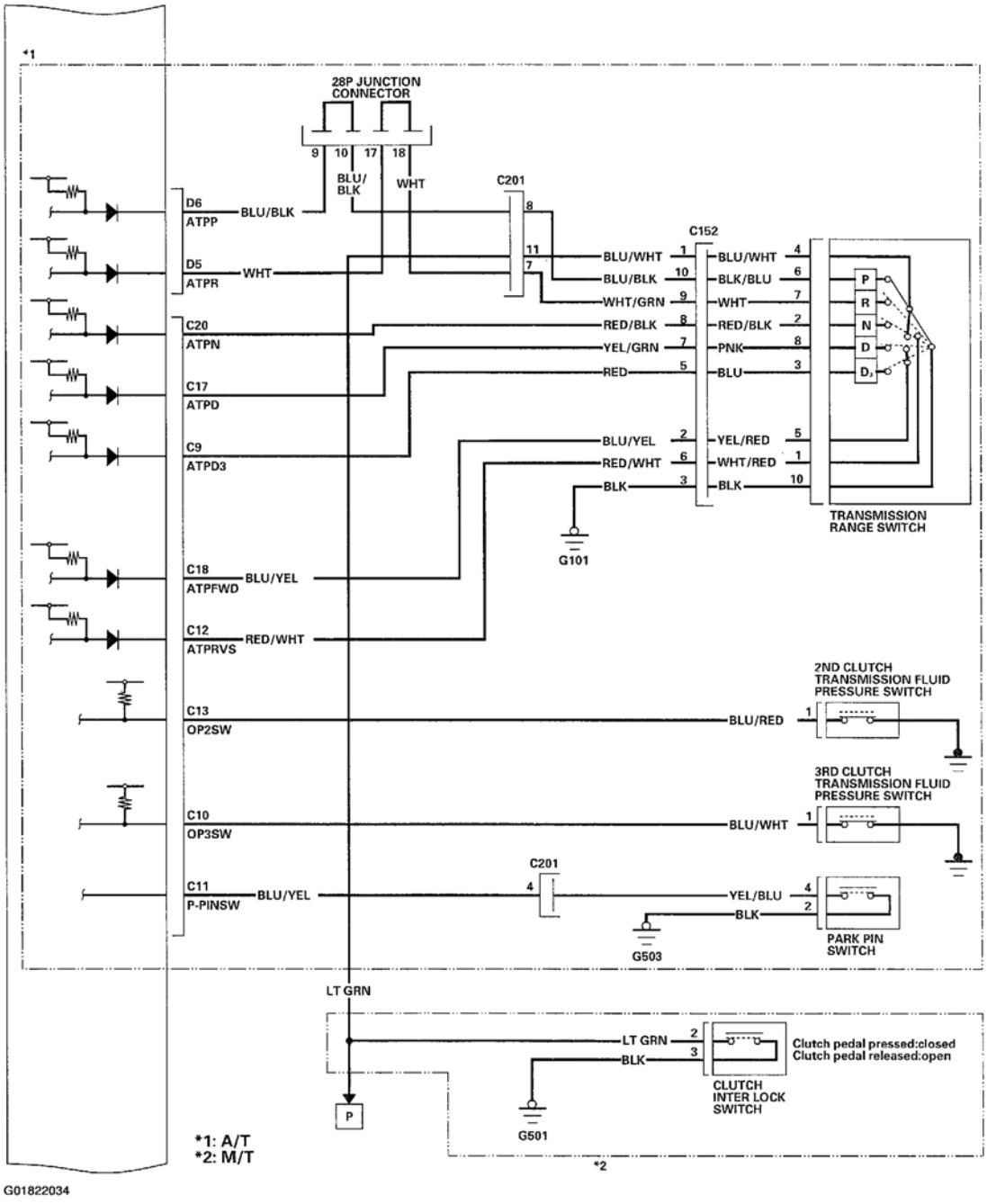

Fig. 66: Evaporative Emission (EVAP) System Wiring Diagram (6 Of 11)

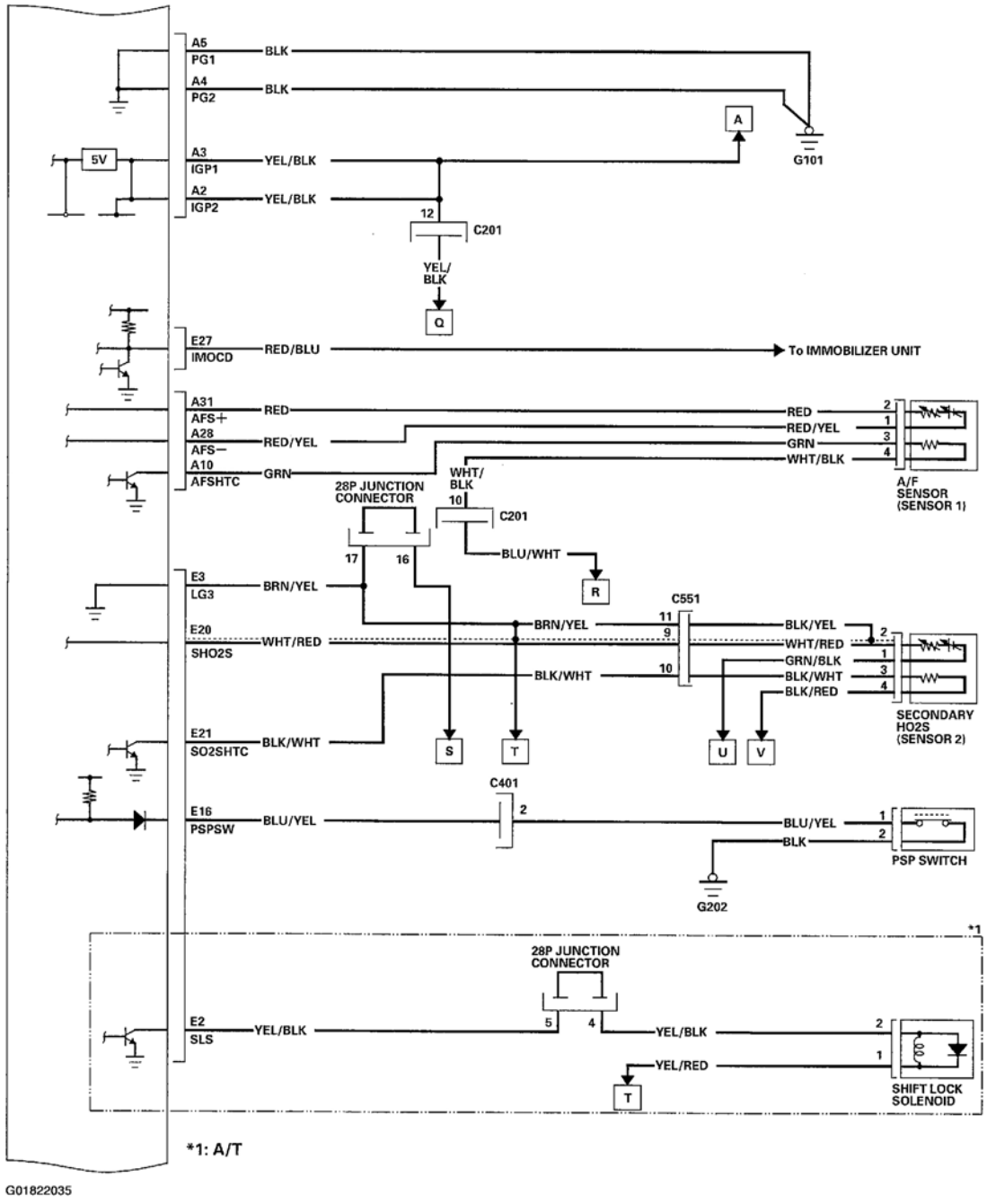

Fig. 67: Evaporative Emission (EVAP) System Wiring Diagram (7 Of 11)

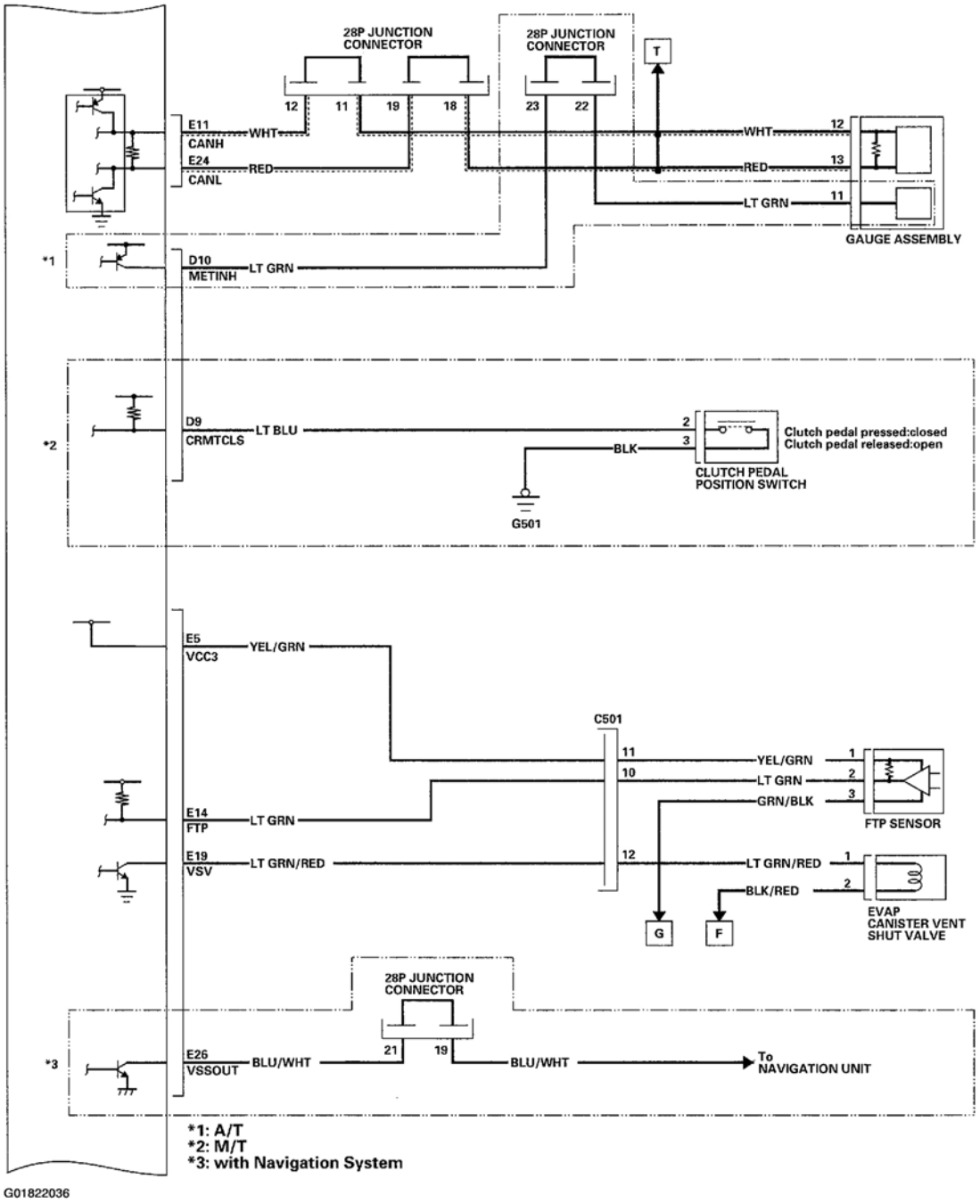

Fig. 68: Evaporative Emission (EVAP) System Wiring Diagram (8 Of 11)

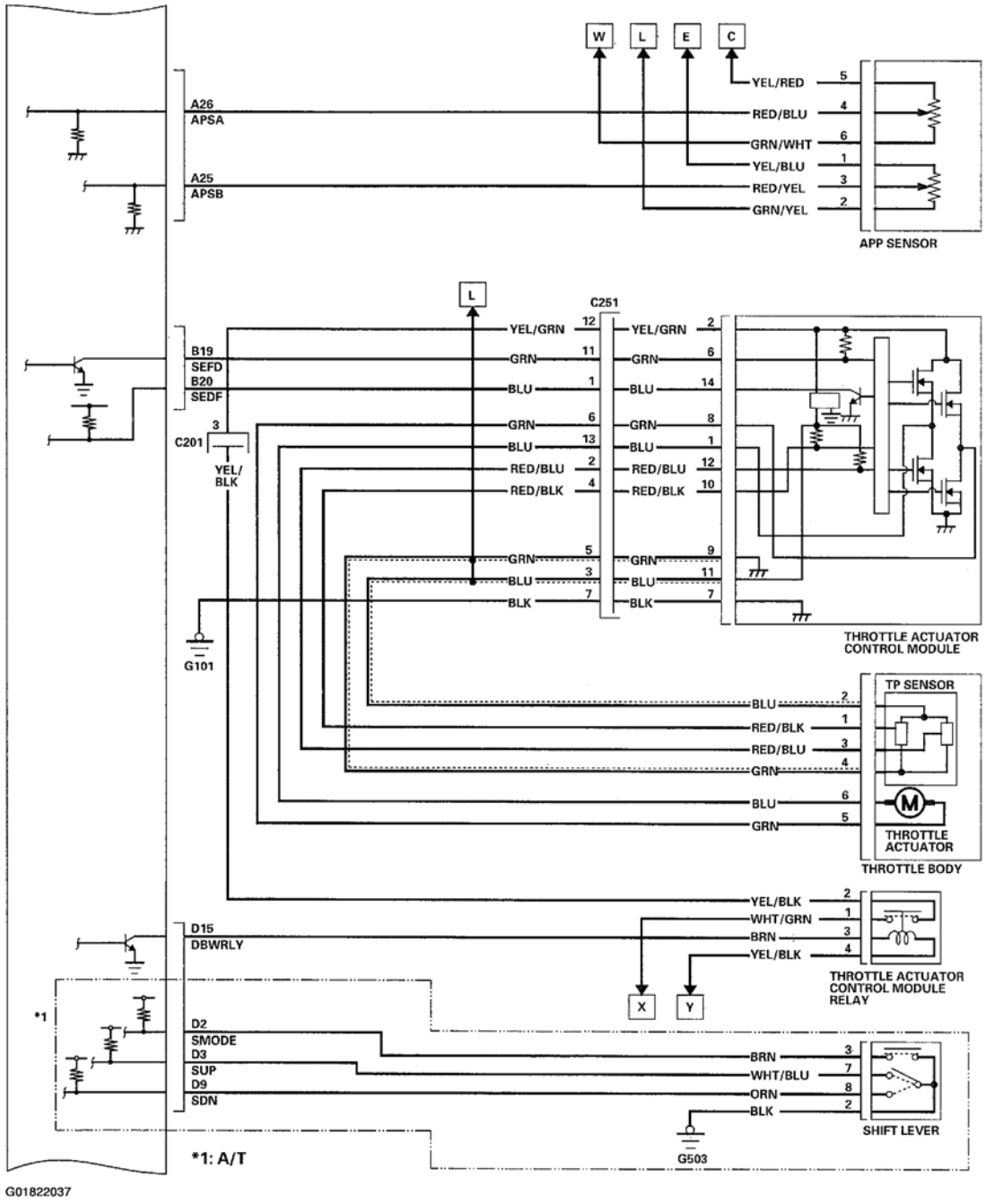

Fig. 69: Evaporative Emission (EVAP) System Wiring Diagram (9 Of 11)

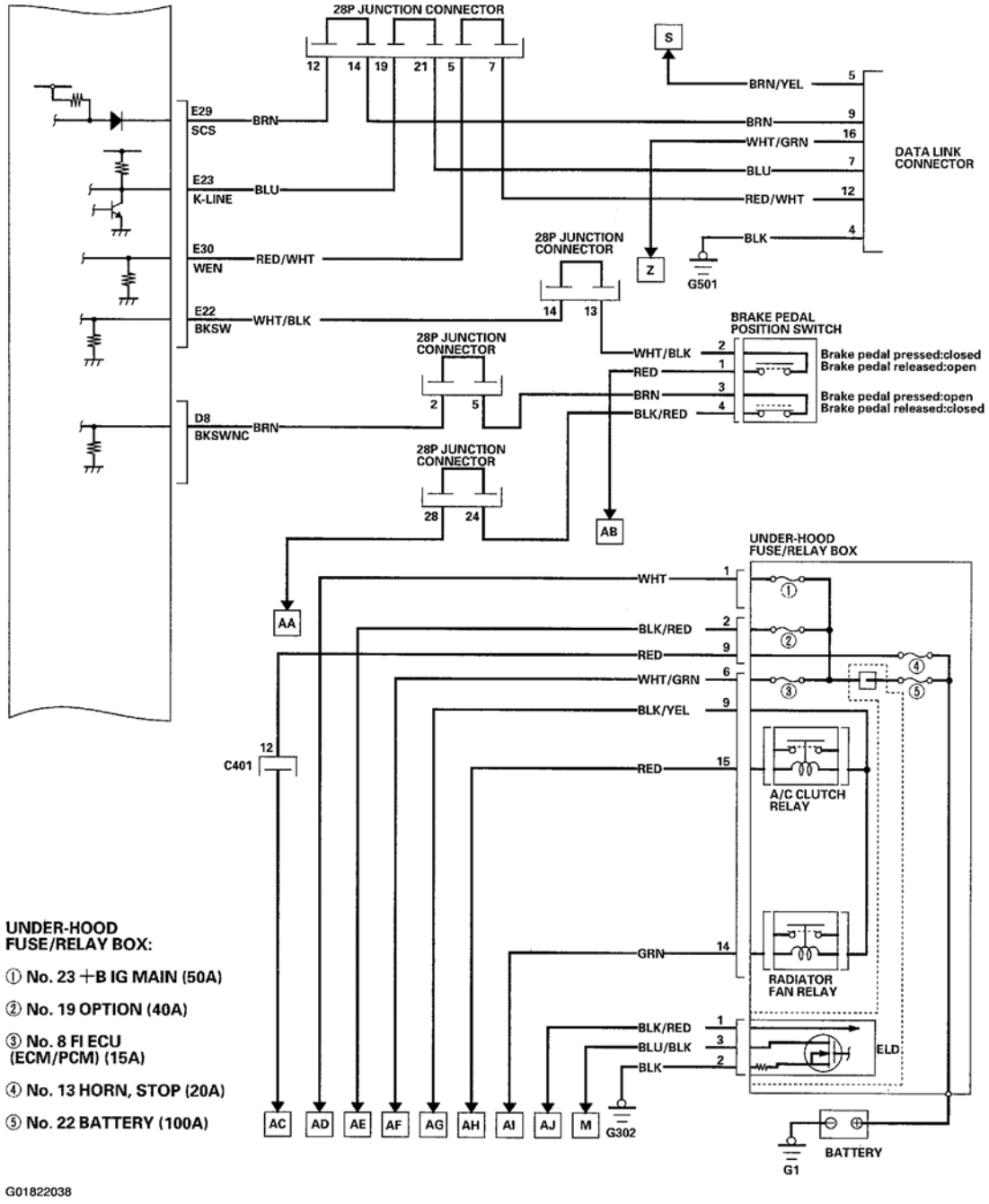

Fig. 70: Evaporative Emission (EVAP) System Wiring Diagram (10 Of 11)

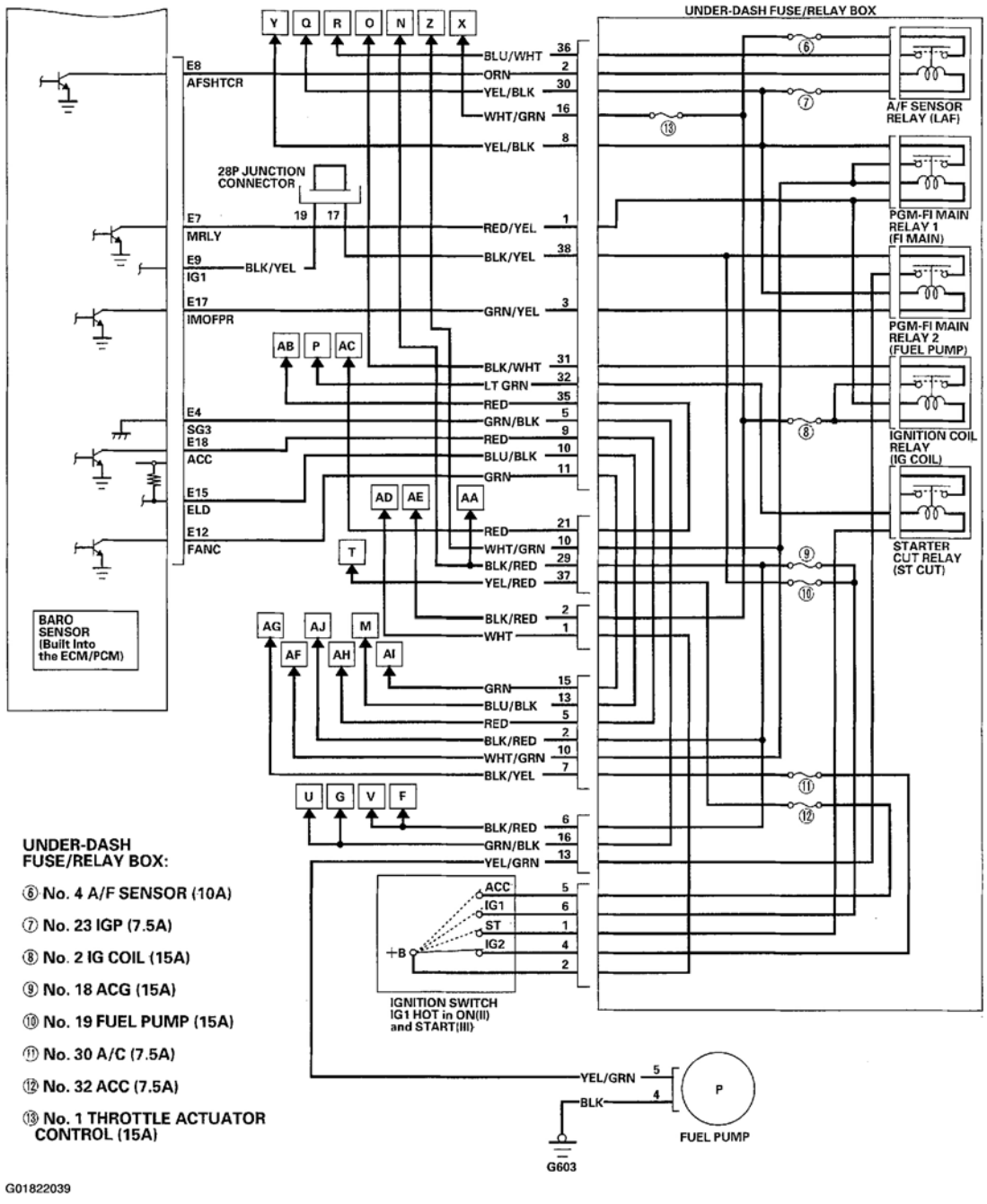

Fig. 71: Evaporative Emission (EVAP) System Wiring Diagram (11 Of 11)

HOW TO SET READINESS CODES

Malfunction Indicator Lamp (MIL) Indication (In relation to Readiness Codes)

The vehicle has certain "readiness codes" that are part of the on-board diagnostics for the emissions systems. If the vehicle's battery has been disconnected or gone dead, if the DTCs have been cleared, or if the ECM/PCM

has been reset, these readiness codes are reset. In some states, part of the emissions testing is to make sure these codes are set to complete. If all of them are not set to complete, the vehicle may fail the emission test, or the test cannot be finished.

To check if the readiness codes are set to complete, turn the ignition switch ON (II), but do not start the engine. The MIL will come on for 15-20 seconds. If it then goes off, the readiness codes are complete. If it flashes five times, one or more readiness codes are not set to complete. To set readiness codes from incomplete to complete, do the procedure for the appropriate code.

To check the status of a specific DTC system, check the OBD status in the DTC MENU with the HDS (see **OBD Status**). This screen displays the code, the current data list of the enable criteria, and the status of the readiness testing.

Catalytic Converter Monitor & Readiness Code

NOTE:

- **Do not turn the ignition switch off during the procedure.**
- **All readiness codes are cleared when the battery is disconnected or when the ECM/PCM is cleared with the HDS.**
- **Low ambient temperatures or excessive stop-and-go traffic may increase the drive time needed to switch the readiness code from incomplete to complete.**
- **The readiness code will not switch to complete until all the enable criteria are met.**
- **If a fault in the secondary HO2S system caused the MIL to come on, the readiness code cannot be set to complete until you correct the fault.**

ENABLE CRITERIA

- ECT at 158° F (70° C) or higher.
- Intake air temperature (IAT) at 20° F (-7° C) or higher.
- Vehicle speed sensor (VSS) reads more than 25 mph (40 km/h).

PROCEDURE

1. Connect the HDS to the vehicle's data link connector (DLC), and bring up the READINESS CODEs screen for Catalyst in the DTCs MENU.
2. Start the engine.
3. Test-drive the vehicle under stop-and-go conditions with short periods of steady cruise. After about 5 miles (8 km), the readiness code should switch to completed.
4. If the readiness code is still not set to complete, check for a temporary DTC with the HDS. If there is no DTC, one or more of the enable criteria were probably not met; repeat the procedure.

EVAPORATIVE EMISSIONS (EVAP) CONTROL SYSTEM MONITOR & READINESS CODE

NOTE: All readiness codes are cleared when the battery is disconnected or when the ECM/PCM is cleared with the HDS.

ENABLE CRITERIA

- Battery voltage is higher than 10.5 V.
- Engine at idle.
- ECT sensor between 176°F (80°C) and 212° F (100° C).
- MAP sensor less than 46.6 kPa (350 mm Hg, 14 in. Hg).
- Vehicle speed 0 mph (0 km/h).
- IAT sensor between 32° F (0° C) and 212° F (100° C).

PROCEDURE

1. Connect the HDS to the vehicle's data link connector (DLC).
2. Start the engine.
3. Select EVAP TEST in the INSPECTION MENU with the HDS, then select the FUNCTION TEST in the EVAP TEST MENU.
    - If the functions are normal, readiness is complete.
    - If the functions are not normal, go to the next step.
4. If the readiness code is still not set to complete, check for a temporary DTC. If there is no DTC, one or more of the enable criteria were probably not met; repeat the procedure.

AIR FUEL RATIO (A/F) SENSOR MONITOR & READINESS CODE

NOTE:

- **Do not turn the ignition switch off during the procedure.**
- **All readiness codes are cleared when the battery is disconnected or when the ECM/PCM is cleared with the HDS.**

ENABLE CRITERIA

ECT at 140° F (60° C) or higher.

PROCEDURE

1. Start the engine.
2. Test-drive the vehicle under stop-and-go conditions with short periods of steady cruise. During the drive, decelerate (with the throttle fully closed) for 5 seconds. After about 3.5 miles (5.6 km), the readiness code should switch from incomplete to complete.
3. Check the readiness codes screen for the Air Fuel Ratio (A/F) Sensor in the DTCs MENU with the HDS.
    - If the screen shows complete, readiness is complete.
    - If the screen shows not complete, go to the next step.

4. Check for a temporary DTC. If there is no DTC, the enable criteria was probably not met. Select the DATA LIST Menu. Check the ECT in the ALL DATA LIST with the HDS. If the ECT is lower than 140° F (60° C), run the engine until it is higher than 140° F (60° C), then repeat the procedure.

AIR FUEL RATIO (A/F) SENSOR HEATER MONITOR READINESS CODE

NOTE: All readiness codes are cleared when the battery is disconnected or when the ECM/PCM is cleared with the HDS.

PROCEDURE

1. Start the engine, and let it idle for 1 minute. The readiness code should switch from incomplete to complete.
2. If the readiness code is still not set to complete, check for a temporary DTC. If there is no DTC, repeat the procedure.

MISFIRE MONITOR & READINESS CODE

- This readiness code is always set to available because misfiring is continuously monitored.
- Monitoring pauses, and the misfire counter resets, if the vehicle is driven over a rough road.
- Monitoring also pauses, and the misfire counter holds at its current value, if the throttle position changes more than a predetermined value, or if driving conditions fall outside the range of any related enable criteria.

FUEL SYSTEM MONITOR & READINESS CODE

- This readiness code is always set to available because the fuel system is continuously monitored during closed loop operation.
- Monitoring pauses when the catalytic converter, EVAP control system, and A/F sensor monitors are active.
- Monitoring also pauses when any related enable criteria are not being met. Monitoring resumes when the enable criteria is again being met.

COMPREHENSIVE COMPONENT MONITOR & READINESS CODE

This readiness code is always set to available because the comprehensive component monitor is continuously running whenever the engine is cranking or running.